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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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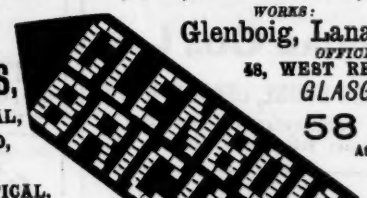

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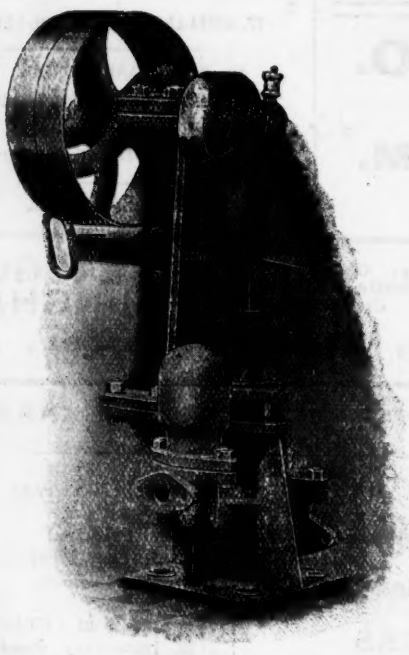

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EDITORIAL NOTES.

Gas Regulation Bill and its Provisions.

PROMISES and predictions have at length ended in actual fact. The long-awaited Bill, which it is proposed shall be the medium by which the statutory conditions of the gas industry in essential particulars may be remodelled to conform with current circumstances, and so remove debilitating incongruity, was introduced to the House of Commons by Sir Robert Horne last Wednesday evening; and we publish the complete text in later columns to-day. It is a Bill to authorize and enable the Board to do all that is necessary, and to give all the Orders they make under the Act the same status as though they were individual Acts of Parliament; it is a Bill that proposes to confer large judicial powers on the Board of Trade; and it is a Bill that is pregnant of a vast change over the whole industry, though there will, or may be, some differentiation for undertakings supplying annually under 100 million cubic feet of gas, in respect of the provision of recording calorimeters, and the contribution to a fund which is to be created for the purpose of defraying expenses. It is clear that it is contemplated that the whole industry shall come within the changed circumstances, so as to secure a basic uniformity throughout. We get this intention as to universality revealed by the clause which provides that if, within two years after the passing of the Act, any undertakers have not applied for an Order, the Board may, after giving not less than three months' notice to the undertakers, make an Order applying to the undertaking, which Order shall have the same effect as one made on the application of the undertakers. Whether an Order is applied for direct or compulsorily conferred, a date will be fixed when it is to come into operation.

When we consider the provisions in which we get the universality of the change established, in conjunction with the other clauses referring to the heat-unit basis of supply and charge, it is plain that a clean sweep is to be effected of all existing illuminating and calorific standards, and a fresh start made with declared calorific values, with provision for substituting a standard or maximum price for each 100,000 B.Th.U. In this connection, the word "therm," as applying to this number of B.Th.U., is to be given the dignity of statutory recognition. No undertaking can change its basis of charging and working to the new one until it has secured an Order, or obtained authorization under a Special Act of Parliament, which alternative procedure the South Metropolitan and South Suburban Companies will be pleased to see. Practically all this, it has been perfectly well understood in the gas industry, had obtained acceptance by the Board of Trade. What has been awaited with considerable anxiety has been the financial authorization that the Board desire. That the judicial powers of the Board must be spacious in this respect is patent when consideration is given to the widely divergent conditions of gas undertakings in magnitude, area, business scope, and purchase and sale conditions. There are hardly two undertakings alike in all these respects. So we find the Board taking power to fix a standard or maximum price which shall "per therm" be the equivalent of the old standard or maximum price per 1000 c.ft., and then to make "such addition (if any) as "appears to the Board reasonably required in order to "meet unavoidable increases since June 30, 1914, in the "costs and charges of, and incidental to, the production "and supply of gas by the undertakers." The Board will also define the additional charge per therm for prepayment consumers; and the condition is being made definite as to altering, adjusting, and replacing of burners, &c. There are clauses as to the composition and pressure of gas in accordance with the Board of Fuel Research report—namely, freedom from sulphuretted hydrogen; a minimum of 2 inches pressure in pipes of 2 inches in diameter and upwards; and for two years the maximum of incombustibles is to be 20 p.ct., for the next two years 18 p.ct., and then 15 p.ct. It is also seen that the super-refiners have scored one point; but only so far that the Board of Trade are making it obligatory upon themselves, as soon as may be after the passing of the Act, to cause an inquiry to be held as to whether any limitation of carbon monoxide is desirable. This is a matter we have discussed before; and it is to be hoped, in their consideration of this matter, the Board will fully weigh the lessons provided by the last twenty years' practical experience. If (as we hope they will not) they do regard a limitation as desirable, general effect will be given to it by a Special Order.

Then as to dividend, "the Order may make such modi- "fications of any provisions whereby the rate of dividend "payable by the undertakers is dependent on the price of gas supplied *as appear to the Board to be necessary*." There may be a little disappointment that something more definite does not appear in the Bill in this regard; but the whole measure is a recognition of the principle of revision on the new economic basis; and we feel confident that the Board will approach their task with this principle guiding them not only in regard to the maximum or standard price, but in respect of dividend. The powers are necessarily open and wide to embrace all conditions. There is, for example, no limitation which compels the adoption of the old sliding-scale with amended terms (as in the case of the South Suburban Bill); and there is no reason why the Board should not endorse the minimum dividend proposal as in the South Metropolitan Bill, with a slide below the standard price, and the division of advantages, including the participation of labour in the profits when the charge for gas is below the standard and the minimum dividend is paid. The Bill, as drafted, is wide enough in its authorization to enable the Board to do what commends itself to be best and fairest in any set of individual circumstances. Under such conditions, in determining dividends consideration should be given to premiums paid, and to dividend losses during the war. It is right that, when a new departure is being made such as this, the controlling Government Department should not be cramped in respect of its authority. There is ample protection given to the consumers by public notice of an application, by the opportunity for raising objections, and by (if, in their discretion, the Board think fit) holding public inquiries. And, moreover, as no one can predict what is going to happen, it will be open to local authorities and others, as well as the owners of an undertaking, to seek revision, by showing the Board that the cost of production and the supply of gas has substantially altered from causes "not within the control of the undertakers." These words are important, as they indicate that the Board do not intend to rob undertakings of the advantages (within the terms of the Orders) of improvements in working accruing from prudent management and internal developments.

The forfeitures in respect of infractions of Orders (unless proved to have been unavoidable) are fairly stringent; and the money protection of consumers in respect of lapses from the declared calorific power are such that there should be confidence by them that justice will be done. This all means much more rigorous supervision of gas manufacture, composition, and quality; and in the result this will not—provided reason prevails—be to the ultimate disadvantage of the gas industry.

New controlling machinery for prescribing and carrying out the testing arrangements is to be set up. It does not specifically state whether the now ancient body of Metropolitan Gas Referees is to be dissolved; but we should imagine that as a Metropolitan institution it will soon cease to exist. Anyway, a body of three Referees, it is proposed in the Bill, shall be appointed by the Board of Trade; and their duties are defined. For appeal purposes there is to be a Chief Gas Examiner. It is made incumbent upon each local authority to appoint a gas examiner, or one can be retained by a group of authorities. There is to be no escape from the obligation to make such an appointment, nor from that of making tests. If local authorities neglect the duty of making an appointment, the County Council in the area can do so; or, failing them, two justices may make an appointment on the application of not less than five consumers —the payment of the gas examiner in any event falling upon the local authority. It will be remarked from this that the supervision of gas supply is to be made compulsory, instead of allowing it (as has been the case in many quarters) to be a matter that can be, and has been, as much honoured in the breach as in the observance. Of course, the industry cannot have the heat-unit system of doing business without some supervision; and the scheme that it is now proposed to apply to the whole country is nothing more than has been in operation in the Metropolis for the past fifty-two years. The installation of recording calorimeters and testing apparatus is all arranged for; and provision and maintenance are to be the duty of the gas undertaking concerned. Another new feature is introduced in the creation of a fund from which the expenses of the supervising authorities—the Referees, the Chief Gas Examiner, and the Board of Trade—will be met. The fund is to be built-up by the payment by undertakings with an output of not less than 100 million cubic feet of £15 per 100 million cubic feet of output. This will not be a heavy expenditure —averaging only 3s. per million. The scheme aims at setting the whole system of gas testing on a more uniform and secure basis, and by regular supervision to displace neglect where it has existed. We see no reason why neglect should not be made a penal offence on the part of local authorities.

Many miscellaneous provisions are included. Among others, there are valuable powers relating to the issue of Special Orders, which, if allowed, will enable gas undertakings by simple procedure to secure authorization to purchase in bulk, to supply industrial gas, and to enter into schemes for combined working and the amalgamations of undertakings, and to secure sanction to the raising of capital and the borrowing of money for the purpose. The accounts of the gas fund it is proposed shall be laid annually before Parliament; and provision is made for the furnishing by gas undertakings to the Board of such statistics and returns as may be desired.

The Bill, which will be read a second time early in June (probably on June 2), adumbrates a new order of things for the gas industry. There are points about it which perhaps some gas men would prefer to see modified. But it is impossible to have things all one's own way. The industry is in a position where in the reorganization of its affairs there must be give and take; but on the balance, the Bill revises its conditions in a manner which (if Parliament endorses it, as it must do if enlightened view prevails) will allow the industry to take a broader outlook, and will clear the way for future progress.

Longer Period for the Ballot.

The balloting papers which are to determine whether or not the gas-workers of the country are to indulge in a strike, in order to try to enforce a scale of wages and hours which the industry knows perfectly well it cannot afford, were returnable last Tuesday; but it was determined by the Federation to extend the date to June 2. Why this extension has been made has not been publicly explained. Is it because the returns are not received in the wholehearted manner that had been anticipated, and are the men showing a disinclination to rush at a strike without due consideration? We know that when this last demand was made for a further advance of wages, large numbers of the gas-workers did not know anything about the matter, and were working quite contentedly. Paragraphs have been appearing in the papers as to certain returns so far made showing a large majority in favour of a strike. But it is estimated that there are 100,000 workers involved in the matter, and the references in the paragraphs are to hundreds, and not to thousands. Coming on top of what has already been done for the gas-workers, the 10s. a week rise in wages—to say nothing of the shorter hours that are proposed, and the higher rates of pay for overtime and week-ends—would mean for the gas industry about £50,000 a week, or £2,600,000 a year. This is a sum not to be lightly contemplated; and with a full sense of responsibility, and a due appreciation of what a strike of gas workers would mean for the country, we feel strongly that the time has now come when gas undertakings must firmly and unitedly present a solid front, and say that the limit has been reached, other than such advance as may be proved to be due owing to the increase in the cost of living. And those responsible for the management of gas undertakings must act up to what they say.

A curious thing about the ballot is that, after the middle of last week, there were some gas-works (report informed us) where the balloting-papers had not been received; and there were others where all the men had not had them, while others had. Perhaps this has been rectified since. It is not known whether this belated distribution of balloting papers was due to bad organization, or anything else. Another point is that in certain areas some of the most extreme men connected with the branches have been sent to address meetings of the workers, who in some cases have been told that, if the men want to be loyal to their Union, they should vote for a strike. A ballot is surely intended to represent the free expression of the opinion of every man, and protect him against undue influence; and every worker should appreciate that, if the ballot has any meaning at all, and it is the chosen means of making determination in connection with taking extreme measures through the machinery of the Union, then there can be no disloyalty to the Union in voting against extreme action of the kind contemplated here. We are quite sure a very large proportion of the gas-workers do not at heart want a strike. To them we would say that loyalty to employers and the community is as important as—if not more important than—loyalty to the Union; and there can be no disloyalty to the Union by doing what is right. As the men are aware, the conditions of employment in the industry are among the best in the industrial world, and there has been less friction in the gas-workers' quarter of this world than in any other. The industry is still prepared to do what is just; it is not prepared to be repeatedly the victim of organized freebooting. After June 2, if the ballot goes in favour of a strike, notices will be given—running probably to a fortnight—to cease work; but we are still hoping for prudence being dominant among the men.

Learned in the Law and Figures, but—

Remarks and statements made by counsel and witnesses appearing in opposition to the South Suburban Gas Company's Bill show conclusively that they have not yet been educated up to the new order of things that has been, and is, steadily coming over the gas industry. They must appreciate that with changed conditions the old arguments and old considerations must give place to new, and that if they wish to keep themselves abreast of the times, and so save themselves from being made to look foolish, they must absorb the knowledge of to-day, and not content themselves with past theories that have been scientifically destroyed. Of course, some men are happy in being able when cornered to plead ignorance; but this is not what one expects from leading counsel at the Parliamentary Bar, nor from experts retained to advise, and to give evidence before Parliamentary Committees on behalf of, the London County Council and Metropolitan Borough Councils. Look at a few examples of the absurdities that were indulged in during the proceedings on the Bill in question. Take statements first by Mr. Freeman, K.C., who appeared for the London County Council. He gravely asserted that "there was no special "reason why a lower [calorific] standard should be accepted, "beyond the fact that the Board of Trade had sanctioned it "during the war, owing to the requirements of the nation "in the matter of explosives, and later on account of the "difficulties with coal." This is a very ludicrous thing—perhaps he did not appreciate it—for Mr. Freeman to say, especially accentuated by him subsequently contending that the figure of 450 B.Th.U. was too low. There are "special reasons" why a low calorific standard should be accepted; and these reasons are economic and scientific.

Mr. Freeman, however, did not stand alone. There was Mr. Harker, who appeared for certain Metropolitan Councils. We had 450 B.Th.U. gas described by him as of "poor "quality," and as "inferior;" and he referred to "com- "plaints" during the war. These, we know, were not complaints due to the calorific value of the gas supplied, but (such as they were, and where they existed) were more likely due to pressure, to want of proper regulation, and to appliances requiring repair. Deficiency of pressure was often attributable to the need for husbanding resources, owing to short and inferior coal supplies; want of proper regulation was due to the absence at the war of the men needed to help and give advice to the consumers; and to the need of repair was owing to insufficient labour and supplies of materials. But in Mr. Harker's brain the one idea seemed to have taken permanent root that it was the calorific value per cubic foot that was at fault. Those with scientific knowledge of the combustion of gases, and of the differences in the quantity of air required to ensure perfect combustion with gases of different calorific values, know full well that it was not the calorific value per cubic foot that was at fault. Then we had Mr. W. B. Keen, an accountant (what he knows about the chemical and physical properties of gas is not specially clear), saying with due gravity, but a lamentable slaughter of economic and scientific facts: "The supply of "gas which it was proposed to stereotype in the Bill was "a war-time measure; and the Council thought it would be "desirable to have one standard throughout London, and "that the same quality of gas should be supplied by the "South Suburban Company as by the South Metropolitan "Company." Upon this, we cannot help saying—when the country is out for coal economy, and the supply of labour-saving heating agents on the most economical lines—"Pro- "tect us from the ignorance of our guardians."

But to put (so to speak) the seal of the London County Council upon what Mr. Freeman and Mr. Keen had said, Mr. James Ollis, the Chief of the Public Control Department of the County Council, said that this body (whose omniscience does not appeal to us) thought it better that the gas of the South Suburban Company should approximate to a standard of 540 rather than to 450 B.Th.U. This and other witnesses considered that the whole of the London gas supply should be, in respect of calorific value per cubic foot, the same as that of the South Metropolitan Company. And these are days when coal economy and manufacturing expenses as low as possible are *desiderata!* The policy of the South Metropolitan Company in supplying high-grade calorific power gas was shown to be largely based on the fact that they have in their area a considerable number of flat-flame burners; and it is this policy that has favoured the retention of flat-flame burners, which require at least 5 c.ft. of gas to do what less than 1 c.ft. of gas would do in an incandescent burner, and compel the carbonization of coal in proportion. For scientific lighting, and for the rest of domestic and industrial operations, such a gas is not requisite; and so the consumers of the major part of the gas used in London (if Parliament was insane enough to comply with the views of the County Council) would be penalized for the consumers of a very minor part for flat-flame lighting. The County Council, with blurred vision and lack of wisdom in this matter, say (through their representatives) that this is the correct thing; while, if the flat-flame burner users would invest in incandescent burners, they would recoup their first cost from their savings in gas, and therefore money, and that very quickly.

This article is not being written for technical readers, but for those (and their like) who showed during the proceedings on the South Suburban Bill that a little information would do them no harm. For their information, it may be said that gas requires air for its combustion. It will not burn without. Having got that in mind, perhaps the representatives of the County Council and the local authorities in this case will get this further fact established in their brains—that the higher the calorific value of the gas, the more liable is it to suffer from imperfect aeration, and therefore waste; and the converse is also the case—with a lower grade gas the better the aeration, and the more perfect the combustion. The next point to grasp is that the lower calorific power gases require less air for their complete combustion than the higher calorific power gases. What matters from the efficiency point of view is not the calorific power per cubic foot of gas before admixture with air, but the calorific value of the gas and air mixture at the point where the combustion takes place. Well, now what happens? Something happens that cannot be avoided. Seeing that the higher calorific value gas requires more air than the lower calorific value gas, there is almost a perfect uniformity of the calorific value per volume of the gas-air mixture at the point of combustion. This has been shown again and again; but Messrs. Freeman, Keen, and Ollis appear to be altogether oblivious of the fact. Some sample figures illustrating this uniformity may be taken from last year's report of the Gas Investigation Committee. A gas of 618 B.Th.U. required 5·47 vols. (or cubic feet) of air for the combustion of 1 vol. 1 vol. + 5·47 vols. = 6·47 vols., by which the 618 B.Th.U. is divided; and the result is 95·6 B.Th.U. per vol. of gas-air mixture. A 541 B.Th.U. gas required 4·68 vols. of air; and the B.Th.U. per vol. of gas-air mixture were 95·3 B.Th.U. A 476 B.Th.U. gas required 4·02 vols. of air; and the B.Th.U. per vol. of gas-air mixture were 94 B.Th.U. A 453 B.Th.U. gas required 3·81 vols. of air; and the B.Th.U. per vol. of gas-air mixture were 94·4 B.Th.U. A 388 B.Th.U. gas required 3·10 vols. of air; and the B.Th.U. in the gas-air mixture were 94·6. Now just mark the uniformity of the B.Th.U. per volume of gas-air mixture with the different calorific values (high and low) per cubic foot of gas: 95·6, 95·3, 94·0, 94·4, and 94·6. Again, just glance at the volume of the products of combustion per cubic foot of gas with the same gases given in the same order: 6·23, 5·40, 4·71, 4·47, 3·80 vols. With the figures before them as to the calorific value per volume of gas-air mixture, we should like the representatives of the County Council and the other local authorities to explain why they described a 450 B.Th.U. gas as "poor "quality," "inferior," and so on, or why they wished the whole of the London gas supply to be raised to the level in calorific power per cubic foot of that of the South Metropolitan 560 B.Th.U. gas? The South Metropolitan Company will not bind themselves to continue 560 B.Th.U. gas; they are awaiting gas-manufacturing developments and experimental results before coming to any decision.

So far as calorific value is concerned, it is clear that, within the range of the calorific figures quoted, the consumer is not, owing to the differences in the volume of air required, injured whatever the calorific value per cubic foot of gas. If he is injured at all, it is by the higher calorific values, and the impossibility with ordinary gas-consuming appliances of getting a proper aeration of the gas. Providing the pressure is sufficient, and the appliances properly adjusted, the consumer has nothing whatever of which to complain as between one calorific value and another, unless it be that (under the individual conditions of a company) the higher calorific gas costs more to produce. This brings us to the economic side of the matter. Gas is going to be sold at "per 100,000 B.Th.U." instead of "per 1000 c.ft.;" and we should like to ask the representatives of the opponents of the South Suburban Bill to tell us, having before them the figures we have quoted above, what difference under the new mode of sale it will make to the consumer whether the B.Th.U. are served up at the rate of 450 or 560 B.Th.U per cubic foot of gas? If, too, more B.Th.U. can be obtained per ton of coal bought, carried, and carbonized by supplying gas lower in B.Th.U. per cubic foot than of the higher thermal value per cubic foot (regard being paid to the contribution to meeting the costs by the sale of the secondary products), then is it to the interests of the public that the London County Council should try to insist on a high B.Th.U. value per cubic foot of gas? In our view, their attitude is not only altogether inimical to the public, but to the national interests.

Gas-Meter Testing and New Conditions.

THERE will be gratification in the gas industry that the Association of Statutory Inspectors of Gas-Meters are moving in the matter of the amendment of the law relating to the testing and stamping of gas-meters. When we think of the very important position the gas-meter occupies in the transactions of the gas industry, and of the changes that have taken place in the supply and uses of gas, and then reflect that meters are tested and stamped under the prescriptions of an Act passed 61 years ago, it needs little argument to justify the submission that the provisions of the Act should be reviewed, amended, and supplemented, in order to ensure that the testing of the instruments, and their authorization for use, are in consonance with modern practical conditions. The neglect of this piece of legislation for so long a period has year by year widened the breach

between the prescribed testing conditions and practical use; and bringing the former into comparison with the latter shows that to a large extent the work of the gas-meter inspectors is almost useless. They can do no more than ascertain that meters are not erroneous under terms that do not exist in practice; and if they are not so, all is well. There is to be a meeting on June 2 in London [this during Institution week], at which the Association will consider a report by the General Purposes Committee, which presents a formidable programme of revision that some people think desirable, but upon which in all respects the Committee do not—and sensibly so—make any recommendations. But the matters that are the subject of recommendation are many and important to the gas industry. Their nature will be found set forth in the report reproduced in our "Miscel-" laneous News" columns to-day. We are glad to see from the report of the Council of the Institution of Gas Engineers (from which we published extracts last week) that they are in communication on the subject with the Association; and it is to be hoped that the Meter Section of the Society of British Gas Industries have also been taken into counsel. This is a matter in which progress in amendment will be assisted if all three bodies could, by the process of give and take, be brought into agreement on every point, and so go forward jointly in the steps necessary to attain the desired objective. A report signed by the Association as representing law and authority, by the Institution as representing the sale and use of gas, and by the Society as representing the manufacture of meters should carry great weight with the Government Department concerned—more weight than a report would do from any one of the bodies standing alone.

The Association are out for stiffening-up the law, and extending the scope of the functions of the Inspectors. We will not at the moment particularly discuss the several recommendations. They are not questions upon which there should be any dogmatic expression of opinion on the part of any individual. But they require to be discussed seriatim from all points of view before adopting any fixed attitude. The Inspectors, it is observed, are desirous of moving with the times, even in respect of raising the testing and stamping fees by 100 p.ct. Several of the suggestions aim at testing the meters under conditions approximating to those in which they are used. But as these conditions are many, this will be rather difficult; and we fail to see how it can be accomplished other than by a prescription that will represent what it may be agreed are fairly average normal conditions, or by taking a minimum and maximum range as to volume and pressure.

The Committee enlarge on these matters when submitting that the test for ascertaining the percentage of error in meters is not sufficiently adequate at the present time, and that the stipulated test as to the quantity of gas per hour to be passed is not practicable with large-size meters. It is their opinion that reasonable accuracy could be ensured by two tests at widely different rates and pressures below and above the normal capacity per hour—below in the case of large meters, above in the case of small meters, because of the need of dealing expeditiously with the additional test with small meters. It is further suggested—this is an old matter of controversy—that the testing of indices should be made compulsory. But Manchester has shown that the defects discovered in indices are not worth the expense incurred in making the tests. Some inspectors think that the periodical reverification of meters should be made compulsory. A fixed period, however, would not be justified, seeing that situation, use, and quality of manufacture are all factors in the time-constancy of meters; and what would be a proper period in the case of one meter, would impose a waste of time and money in the case of another. The Committee have no evidence to show that meters are not repaired and verified within such periods as could be suggested as compulsorily necessary; and therefore they make no recommendations under this head. Again, it is found that the idea has taken root in some quarters that the coin mechanism of prepayment meters should be tested. The Committee take the sensible view that this test would very seriously impede the work of the stamping office, and that official regulation should cease with the stamping of meters and indices when found to be sound and registering correctly. The Committee deal at some length with the testing of high-pressure meters. The suggestion is made that there should be additional legislation on the lines of the London Act of 1914, which applies specially to the testing of high-pressure meters; but it will also be seen that the Committee propose that certain inconsistencies should be taken into consideration in drafting any amending Bill.

Other questions, as will be noted, are raised in the report; but the foregoing are among the principal matters dealt with. While we are favourable and anxious that proper amendment should be made to bring the testing of meters into harmony, as far as possible, with current use, it is to be hoped that co-operation in the lines of amendment will operate to prevent the expansion of the duties of the inspectors to a cumbersome and unnecessary degree, and the cost of testing and stamping to an unreasonable figure.

[Since this article was written, the Gas Regulation Bill has been published; and the text is reproduced elsewhere. Under the "General" section of the Bill, the Board of Trade take power to repeal the fees provided by section 19 of the Sale of Gas Act, 1859, and to fix such others as they may think fit. Power is also included to make regulations with reference to any measuring instrument of a pattern certified by the Board.]

Public Utility Companies' (Capital Issues) Act.

The Public Utility Companies' (Capital Issues) Bill has been Royal Assented; and many companies will now desire to take advantage of its provisions to raise capital for extensions and developments of business. In the later stages, an amendment was introduced which makes it obligatory to give notice to local authorities of any proposed application under the Act, so that, if they have any objections to make, there may be an opportunity for their consideration.

Compulsory Benzol Production.

The House of Lords Committee, in considering the South Metropolitan Gas Company's Bill, did not comply with the request of the Automobile and other Motor Associations that a clause should be inserted making compulsory the washing of gas for benzol. But the Motor Legislation Committee, the Royal Automobile Club, and the Commercial Motor Users' Association are not going to accept this first rebuff as final. They have been interviewing the Parliamentary Secretary to the Board of Trade (Mr. Bridgeman) with the idea of getting a clause inserted in the Gas Regulation Bill to make scrubbing for benzol a compulsory proceeding in gas-works. They founded their application on "national interests." Mr. Bridgeman has promised that the subject shall receive careful consideration. Of course, it is for the gas industry all a question of which will pay it and its gas consumers best—to scrub or not to scrub. However, the struggle on the part of the motor world to boost-up the production of home supplies of motor fuel is interesting, especially to those so closely concerned as gas undertakings.

Coal Prices and the Miners.

The Miners' Federation are not going to miss the opportunity for making trouble over the action of the Government in putting the coal industry on an economic basis, and stopping the subsidizing of home-used fuel, which they cannot now afford. The Federation are convening a conference for June 10 to consider the latest phase in the industry's position. Notwithstanding their grave objection to the increased cost of living, and a boasted earnest desire that means shall be taken to reduce it, they do not appear to mind to what extent industrial coal goes up in price. But they do not approve of the rebate being taken from domestic coal, and 4s. 2d. added—making the increase 14s. 2d. If the Government persist in their proposal, the Federation threaten an application for more wages for the miners. At the moment it appears they favour the policy of alternative wage proposals on these lines: An advance of such an amount as would give the miners a proportionate share in the larger income which will be derived from industrial coal. A much larger advance in wages unless the Government are prepared to withdraw their recent increase of 14s. 2d. per ton on the price of domestic coal. This alternative demand is to be made the bargaining lever to compel the Government to continue the subsidy on domestic coal.

Coal Distribution Reorganization.

An attempt is being made to collect the necessary evidence for preparing a case for bringing about a much-needed improvement in the distribution of coal on the basis of quality and desirable characteristics for special purposes. An opportunity is being

given to the managements of gas undertakings (who are much concerned) to assist in this work. We hope all will regard it as a duty to do their part in supplying the information desired.

Gas and the Cost of Living.

In the current issue of the official "Labour Gazette," statistics are published showing that the cost of living, presented as an average of all items, went up nine points during April—making the increase in May on the pre-war standard 141 p.ct. But the increase in gas (allowing for the rebate on domestic coal) is put at 60 p.ct., while lamp-oil has increased by 200 p.ct., and candles (cheap kinds) about 250 p.ct. Of course, the 60 p.ct., allowing for the rebate, is an average figure, because there are prominent undertakings that show increases of between 80 and 90 p.ct. and a little over 100 p.ct.—in both cases not allowing for the rebate. These figures will have to be amended shortly—the 60 p.ct. will go up on account of the withdrawal of the rebate, and there will be a further rise owing to the increased cost of coal. Also labour charges are on the road to augmentation. But these percentages for gas are moderate compared with other commodities, and with the percentage of advanced charges upon gas undertakings quoted by the Governor (Mr. D. Milne Watson) at the last meeting of the Gas Light and Coke Company—viz., coal, 116 p.ct.; oil, 340 p.ct.; freights, 325 p.ct.; and wages, 145 p.ct. The increase of the total net expenditure in the case of another undertaking per 1000 c.ft. is put down at 125 p.ct. It cannot therefore be said that the consumers have suffered at the hands of gas undertakings; it is the shareholders who have suffered.

Gas Heating in Hot Climates.

In hot countries the use of gas for heating purposes is growing at a rapid rate. This seems a bit anomalous; but nevertheless it is a fact. Mr. H. E. Jones spoke about it at the meeting of the Bombay Gas Company last Thursday week; and he finds the same thing not only in India, but in Buenos Ayres and the South of France. The secret of this is that, in addition to the saving of labour, people in such countries are beginning to find out that gas has a double advantage over solid fuel as an agent for heating water and cooking. It need not be started until it is required; and it can be turned out immediately the work is done. Thus heat is only being generated just as long as, and no longer than, is necessary. The second advantage is that gas does its work promptly; so there again a saving is realized in the time during which heat is being produced. These are being recognized as important considerations in the domestic life of hot countries.

Inclined Retorts at Charlotte, U.S.A.

The carbonizing plant at Charlotte (N.C.) has recently been extended by adding four new benches, which are now making gas in excess of the specified capacity of 87,000 c.ft. per bench per day, with a coal that will yield 5 c.ft. of gas per pound. The installation is described in the New York "Gas Age" by Mr. S. Bent Russell, who says that the retort mouthpieces on the discharging side are connected to two steel Congdon stand-pipes on each bench. There is a disc-valve for every retort. Each stand-pipe connects at the top with a 7-in. bridge-pipe and a 10-in. dip-pipe leading into a hydraulic main of the usual type; and at the bottom there is a seal and a connection to a tar-main that runs to a tar and liquor well. A small centrifugal pump circulates the liquor from the well back to the stand-pipes. The foul main is 12 in. diameter. In this system, the liquor sprays in the stand-pipes prevent the stopping of pipes. From the discharge outlets of the bunker, coal is dropped into the weighing hopper of the charging larry, which is a patented type, built of steel. At the top there is a hopper which holds enough coal for the maximum charge. The hopper is balanced on scale-beams, so that the operator can put in a charge of given weight. The weighing-scale beam is at a convenient height above the charging floor. There are three discharge spouts, one for each horizontal row of retorts. Each spout has a movable section that may be pushed into the retort. The coal is directed into the particular spout by a steel deflector plate hinged at the bottom edge. The coal is retained in the weighing hopper by a slide-valve. There is a horizontal overhead track above the charging floor, on which the larry runs—being propelled by a hand chain. There is no difficulty in operating the larry; and the man soon learns to handle it so that the work of charging is done with ease. Allowing two men per day for feeding the coal-crusher, five benches could be operated with twelve men.

The Wales and Monmouthshire District Institution of Gas Engineers and Managers will meet at Brecon on Thursday, June 10, when the business will include a paper by Mr. H. D. Madden, of Cardiff.

ELECTRICITY SUPPLY MEMORANDA.

THE Amending Electricity Supply Bill, which revives the clauses that were lifted from last session's measure for convenience, and to save the complete wrecking of the Bill, is destined to run the gauntlet of severe opposition; and if the Government succeeds in face of the resolute hostility, it will be a remarkable thing. The compulsory district boards are not wanted; and nobody likes the compulsory purchase terms. There are those, too, who object to the State financing of industrial enterprises of this character, and so removing or weakening an important incentive to private enterprise in this direction. In these proposals, singly and collectively, are the first steps to nationalization. The Government may not see them, but they are there nevertheless, as other men know. But Government electrical plans are sacrosanct; and genuine and competent adverse criticism, something to be ignored. However, the Government are likely—obstinate though they may at present appear to be in connection with this resuscitation—to find an opposition marshalled against them which they cannot afford to treat with indifference. It will come from within and outside the electricity supply industry: From outside, not because this is an electrical question, but because of the principles and the new policy involved, the adoption of which would mean the sowing of seeds for mischief throughout our industrial system. From inside, because the electricity industry sees in the Electricity Commissioners, and the existing authorization which enables the Commissioners to co-ordinate the generation of electrical energy, an amplitude of power without compulsion, and without being tied to the strings of the spacious apron of the Government. It is certain that the more the Government do for the industry (if they do anything) in the way of financial succour, the more control they will exercise over its operations. The "Electrician" seems to stand alone in favour of the new Bill. It says the present Act is all very well, but it leaves the Commissioners no powers to push their ideas home—not against the progressives who are in the majority, but against the reactionaries who, although in the minority, may prove awkward to deal with. From the intelligence that reaches us, the Commissioners seem to be getting to work pretty well, and require no more power and stimulus than they at present possess to do some very effective work for the electrical industry. If our contemporary examines the opposition, it will find that the "progressives" in the electrical industry are those who are the strongest in opposition to the revived clauses. The Electrical and Allied Trades Section of the London Chamber of Commerce has passed a resolution declaring that the Amending Bill is a serious discouragement to enterprise, and would inevitably tend to State trading to a large and increasing extent.

The Rising Tide of Opposition.

Hiring Allowed, but not Sale.

When the Lords Committee, presided over by the Marquis of Bristol, had before them the Cardiff Corporation Bill, which seeks additional tramway and electricity supply powers, they gave a ruling on the subject of the sale of electrical fittings by municipalities. The Corporation desired power to sell as well as to hire-out—selling at present only being allowed, not to the consumer direct, but through an independent trader. This is one of the results of municipalities attempting to obtain powers to deal in electrical fittings after men had established themselves in business as electrical contractors and salesmen of fittings. Electrical contractors were successful year after year in opposing in Parliament municipalities encroaching on their established businesses; and eventually lines of agreement were arrived at which found expression in the Electric Lighting Act of last year. The Lords Committee in the Cardiff case ruled that the clause in last year's Act should apply; and so the Corporation will not be allowed to sell, though they may provide and let for hire. The clause provides: "A district Electricity Board, and any local authority authorized by Special Act or by Order to supply electricity may provide, let for hire, and in respect thereof may connect, repair, maintain, and remove (but shall not, unless expressly authorized to do so by the Special Act, manufacture or sell), electric lines, fittings, apparatus, and appliances for lighting, heating, and motive power, and for all other purposes for which electricity can, or may be used, and with respect thereto may demand and take such remuneration or rents and charges, and make such terms and conditions, as may be agreed upon."

The Electricity Commissioners Giving Offence.

There must, of course, be some amount of standardization in connection with electricity supply legislation, as there is in that of gas supply. There are numerous clauses that are common to all gas undertakings. The "Electrician" appears to be a bit upset over Parliamentary Committees taking the attitude that everything relating to electricity supply, including special powers required to meet exceptional circumstances, must have the approval of the Electricity Commissioners. Are they taking up this attitude? They have their duty to perform; and in its performance they are bound to make some bad friends. But this does not prove they are wrong. Our contemporary says the Commissioners' policy

on the question of special electricity powers is not clear. It cites the proposal as to the hiring and selling of fittings and motors; mentioning the Swansea Bill. Another electrical contemporary referred (as seen in the previous paragraph) to the Cardiff Bill. Whether or not both corporations have been asking for like powers in this respect, we have not, at the time of writing these notes, the information to verify the point. But this does not matter. The "Electrician" thinks that the clause in the General Act of last year prohibiting selling while permitting hiring-out, is not sufficiently wide. But if this is an agreed clause, and we do not remember there was any opposition on the part of local authorities to its terms when the Bill was before Parliament, then it is precisely the form of provision that should have general application until Parliament sees fit to alter its terms. We have dozens of clauses of stereotyped form applying to gas supply undertakings.

The Rejected Relief Bill.

Another instance cited by our contemporary is one which invites more sympathy. It is the rejection of the Bill promoted by the Edmundson Electricity Corporation and associated companies, who sought an increase of the maximum price of electricity to 1s. 2d., with a minimum dividend of 6 p.ct., until the charge is below 1s., and then with reductions of price the dividend was to increase. The "Electrician" would like to know the reason for the rejection. This it might be able to ascertain if it could see the report of the Electricity Commissioners. As no general legislation has yet been introduced dealing with this matter for electricity undertakings other than the Temporary Increase of Charges Act, with its miserable and crippling terms, and no indication has been given of legislation to amend for electricity companies those terms on a permanent basis (which has now become necessary owing to the positive change in the country's economic conditions), there is no reason why Parliament should not have dealt at once with a definite application such as that which was put before it. However, our contemporary, pointing out that the case of the companies in question is undoubtedly a hard one, hopes that the Commissioners or the Ministry of Transport will introduce suitable legislation to enable the various undertakings to pay a reasonable return on their capital. This is a very fair suggestion; and the companies must not let the matter rest. The Directors of the Urban Electric Supply Company—one of the promoters of the rejected Bill—referring in their annual report to the collapse of the application, says that endeavours are now being made to secure relief by other means.

Generation Concentration Schemes.

There is a somewhat scattered enthusiasm over the consideration by local authorities of co-operative schemes for electricity generation in compliance with the intentions of the Electricity Supply Act of last session. We have referred to proposals from time to time. Among fresh movements is a scheme for Mid-Lancashire. A meeting has been held at Preston to discuss an area under the Act; and the desirability has been suggested of forming a district to include these authorities: Accrington, Bacup, Blackburn, Blackpool, Burnley, Colne, Darwen, Haslingden, Nelson, Preston, Rawtenstall, Brierfield, Fleetwood, Lytham, St. Anne's, and Whitworth. Representatives of authorities round about Buxton have also had a conference for a similar purpose. But, in this instance, it was decided that, owing to the great cost involved, especially in transmission over a big stretch of country, the scheme was impracticable—the general opinion being that New Mills, with its many extensive works and water power for a generating station, was well suited to have a scheme of its own. There are many of the smaller towns with electricity powers that are connecting-up to power companies. It is noticed that the Kirkcaldy Town Council are now proposing to sell the whole of their undertaking to the Fife Electric Power Company, owing to the Electricity Commissioners refusing to sanction extensions to the local power station. The sale has received the endorsement of the Commissioners. These are signs of the new times in electricity generation.

A Critic Criticized.

An article is published in the "Electrical Review" by Mr. G. W. Stubbings, which criticizes the recent contributions to the columns of our contemporary by Mr. B. L. Klemens; and Mr. Stubbings shows that the electrical critic of Sir Dugald Clerk was wrong in his conclusions. This was not a difficult task. If Mr. Stubbings will now take the trouble to read-up the criticisms by Sir Dugald, as well as those made by ourselves, he will find that the basis of Mr. Klemens's case was quite wrong in several respects. There is not much profit in discussing anything that is fundamentally unsound, and there would perhaps be more profit to the readers of the "Review" if Mr. Stubbings, who is blessed in this connection with more rational views than Mr. Klemens, would take up Sir Dugald's corrections of that gentleman and the recent lecture to the Institution of Civil Engineers, and show where the eminent investigator of the subject has gone astray. We will not go into Mr. Stubbings's calculations, for the answer, as to efficiencies and other matters, is already in print in the lecture and articles that have appeared. We would, however, like to call his attention to the fact that the efficiencies of developments in modern gas appliances are above those that are taken by Sir Dugald Clerk; but he preferred in order to have something in hand to rely on average conditions rather than what must be the progressive figure as new forms of appliances are adopted. We must also point out to him that he has fallen into serious error in taking Mr. Klemens's figure of 8 cwt. of coke per ton of coal carbonized, 4 cwt. of which are sold and 4 cwt. used in gas production. If he had seen a note in the "Memoranda" for Feb. 24, he would have remarked that the Gaslight and Coke Company last year carbonized 2,082,059 tons of coal, from which 1,290,563 tons of coke were made. On the works 222,386 tons were used, and 1,069,095 tons were sold. The difference (918 tons) between the make of coke and the total quantities used on the works and sold was taken from stock. These figures show that a quantity of coke was sold and paid for exceeding 10 cwt. per ton of coal carbonized. This is a very common experience. Then why credit coal carbonization with only 4 cwt. of coke for sale? Mr. Stubbings tells Mr. Klemens that his examination of the arguments he employed to arrive at the conclusion that the thermal efficiency of the electrical and gas processes are in the ratio of 18 to $14\frac{2}{3}$ in favour of electricity reveals a considerable lack of clearness. This Mr. Klemens has been told before; but he has not yet ventured upon a reply to Sir Dugald Clerk's criticism of his efforts. Again, Mr. Stubbings admits that "it appears probable that sufficient justice has not been done [by Mr. Klemens] to the claims of gas." He agrees that, though the use of the electric-oven gives superior results to those of gas (which is a point at issue that is open to demonstration), the combined efficiency of the whole of the domestic heating processes, including the provision of hot water, is more favourable to gas than to electricity; and, further, he submits that it does not seem unreasonable to conclude that, from the standpoint of thermal efficiency, gas authorities can offer a more economical system of domestic heating than can at the present time the electric supply undertakings. We agree with him, because we know the claims to be true. While, however, confessing that as regards the cost of operation, electricity will usually be more expensive than gas, he holds that there are operations in which the convenience and cleanliness of electricity will count more than thermal efficiency. Even so, cost is the main thing with the multitude. We should much like to see the results of Mr. Stubbings's investigation of Sir Dugald Clerk's figures; and then we are sure that nothing would give the British Commercial Gas Association, acting on behalf of the gas industry, greater pleasure than to have a joint public demonstration with consumptions, efficiencies, time, work done, and costs all measured, of gas appliances for heating, cooking, and hot-water supply if the electricity industry would arrange to do its part in respect of electric appliances. This would take us away from computations to actualities; and in the event Sir Dugald would be more than justified in all he has said and written.

Labour-Saving Devices in the Gas Industry.

A paper on labour-saving devices that may with profit be used in the gas industry was read by Mr. George A. Neal before the Indiana Gas Association. In common with the entire industrial world, the author said, the gas industry is confronted with the problem of meeting the rapidly growing demand for its product and overcoming the handicap of a constantly diminishing supply of suitable labour. Reliable reports indicate that the so-called labour shortage is world-wide, with no known surplus—thus eliminating any immediate prospect of re-arranging the world's labour supply so as to relieve the prevailing scarcity. The indication therefore is that every mechanical expedient must be applied to remedy this condition. The diversity of situations is so great that the needs of each station must be analyzed, and proper devices adapted to its own particular need. Mr. Neal suggests a large number of applications of labour-saving devices, considered from the standpoint of executing the vital work in spite of current handicaps, as well as from the financial returns to be expected. These include various appliances to obviate the labour of shovelling; automatic water-gas sets; the installation of hydraulically operated valves on hand-operated water-gas sets; large high-pressure blowers to increase the output of old water-gas sets by 30 to 50 p.ct.; enlarged connections and modern linings on old water-gas sets, to increase the capacity 10 to 20 p.ct.; the installation of large water-gas sets, to replace two or more small sets; waste-heat boilers, to reduce boiler fuel; revivification of oxide *in situ*, with complete exhaustion of oxide without change; trenching machines; pipe-pushing or boring machines for service work; and valve-inserting machines for installing valves in high-pressure mains without shutting-off the main. These are but a few of the suggestions offered.

The first annual meeting of the National Association of Technical Gas Officials will be held on June 2 at the Institution of Mechanical Engineers, Storey's Gate, Westminster. The notice convening the meeting states that "non-members are specially invited to attend."

The fourth half-yearly auxiliary meeting of the North of England Gas Managers' Association will be held at Newcastle next Saturday afternoon, under the chairmanship of Mr. J. E. Morfett, of Sunderland. Two papers will be submitted—one by Mr. G. Weyman, M.Sc., on the "Practice and Control of Oxide Purification;" and the other by Mr. J. F. Fowler, on "Distribution Topics."

THE GAS REGULATION BILL.

The Heat Unit Basis of Charge and the Proposed New Terms.

A BILL to amend the law with respect to the supply of gas was presented to the House of Commons last Wednesday by Sir Robert Horne (the President of the Board of Trade), supported by Mr. Munro, Dr. Addison, Mr. Bridgeman, and the Attorney-General for Ireland. The object is to permit the substitution, by Order of the Board of Trade, for existing provisions, of power to charge for thermal units supplied in the form of gas—the price to correspond as nearly as may be to that fixed by the existing provisions, but with any addition that may appear to the Board to be reasonably required to meet unavoidable increases in costs and charges since June 30, 1914. The Order may also make such modifications as appear to the Board to be necessary of any provisions whereby the rate of dividend payable by the undertakers is dependent on the price of gas supplied. The Bill is a somewhat long one; but in view of its far-reaching importance to the gas industry, we reproduce it *in extenso*.

PRICE AND QUALITY OF GAS.

POWER TO SUBSTITUTE NEW BASIS OF CHARGES.

1.—(1) The Board of Trade may, on the application of any gas undertakers, by order, provide for the repeal of any enactments or other provisions requiring the undertakers to supply gas of any particular illuminating or calorific value, and for substituting power to charge for thermal units supplied in the form of gas.

(2) An order under this section may provide for modifying the statutory or other provisions affecting the charges which may be made by the undertakers, by substituting for the standard or maximum price authorized under those provisions a standard or maximum price for each 100,000 British thermal units (in this Act referred to as a "therm").

(3) The price per therm fixed by the order shall be a price corresponding as nearly as may be to the price fixed by those provisions for each 1000 cubic feet, but with such addition (if any) as appears to the Board reasonably required in order to meet unavoidable increases since the 30th day of June, 1914, in the costs and charges of and incidental to the production and supply of gas by the undertakers; and the order may make such modifications of any provisions whereby the rate of dividend payable by the undertakers is dependent on the price of gas supplied as appear to the Board to be necessary:

Provided that if at any time it is shown to the satisfaction of the Board of Trade that the cost of production and supply of gas has substantially altered from causes not within the control of the undertakers the Board may, if they think fit, on the application of the undertakers or of the local authority, or, where the local authority are the undertakers, of twenty consumers, make an amending order correspondingly revising the powers of charging authorized by the original order.

(4) An order under this section—

(*a*) shall prescribe the time when, and the manner in which, the the undertakers are to give notice of the calorific value of the gas which they intend to supply (in this Act referred to as the "declared calorific value");

(*b*) shall require the undertakers, before making any alteration in the declared calorific value, to take at their own expense such steps as may be necessary to alter, adjust, or replace the burners in consumers' appliances in such manner as to secure that the gas can be burned with safety and efficiency;

(*c*) may prescribe, subject to such conditions as the Board may think necessary, the additional charge per therm which the undertakers may make in respect of gas supplied by means of prepayment meters;

(*d*) may make such supplemental and consequential provisions as appear necessary to give full effect to the order;

(*e*) shall come into operation on such date as may be fixed by the order;

(*f*) shall have effect as if enacted in this Act.

(5) If within two years after the passing of this Act any gas undertakers have not applied to the Board of Trade for an order under this section, the Board of Trade may, after giving not less than three months' notice to the undertakers, make an order applying to that undertaking, which shall have the same effect as an order made on the application of the undertakers.

(6) Before making any order under this section the Board of Trade shall require the undertakers to give public notice, in such manner as the Board may consider best adapted for informing persons affected, of the application for an order, and of the maximum or standard price per therm proposed, and as to the manner in which, and time within which, objections may be made, and shall consider any objection which may be duly made, and shall, where they think it expedient to do so, cause an inquiry to be held.

(7) The calorific value of gas means, for the purposes of this Act, the number of British thermal units produced by one cubic foot of the gas burned under normal conditions in a calorimeter prescribed by the Gas Referees under this Act.

COMPOSITION AND PRESSURE OF GAS TO BE SUPPLIED.

2.—(1) Where an order under this Act has been made affecting any undertakers, the gas supplied by those undertakers, in addition to conforming to the conditions prescribed in the order, shall comply with the following conditions, that is to say:

(i) it shall not contain any trace of sulphuretted hydrogen when tested in the manner required by this Act;

(ii) it shall be supplied at not less than the minimum permissible pressure;

(iii) it shall not, if so prescribed by the order, contain more than the permissible proportion of incombustible constituents;

Provided that the foregoing requirements shall not apply as respects a separate supply of gas by any undertakers for industrial purposes only; but an order may impose such other conditions with regard to gas supplied by those undertakers for those purposes as appear necessary to the Board of Trade.

(2) The minimum permissible pressure shall be such pressure in any main or service pipe of 2 in. diameter and upwards as to balance a column of water not less than 2 in. in height, except as may be otherwise provided by the order relating to any undertaking.

(3) Where an order provides that the gas supplied by any undertakers is not to contain more than the permissible proportion of incombustible constituents, the permissible proportion of incombustible constituents shall be: For a period of two years after the passing of this Act, 20 p.ct.; for the succeeding two years, 18 p.ct.; and thereafter, 15 p.ct.

(4) The Board of Trade shall as soon as may be after the passing of this Act cause an inquiry to be held into the question whether it is necessary or desirable to prescribe any limitations of the proportion of carbon monoxide which may be supplied in gas used for domestic purposes, and may, if on such inquiry it appears desirable, make a special order under this Act prescribing the permissible proportion; and the special order may have effect either generally or as regards particular classes of undertakings, and the provisions of the special order shall have effect as if they were enacted in this section.

RESTRICTION ON POWER TO CHARGE FOR THERMAL UNITS.

3. It shall not be lawful for any person to charge for the supply of gas according to the number of British thermal units supplied unless authorized to do so under this Act or by special Act of Parliament.

TESTING OF GAS.

APPOINTMENT OF GAS REFEREES AND EXAMINERS.

4.—(1) The Board of Trade shall appoint three persons, at least one of whom shall be a person having practical knowledge and experience in the manufacture and supply of gas, to act as Gas Referees.

The Board of Trade shall also appoint a competent and impartial person to be Chief Gas Examiner.

The Gas Referees and the Chief Gas Examiner shall hold office for such time as the Board of Trade may direct.

(2) Two of the Gas Referees shall be a quorum; and at least two of the Gas Referees shall concur in every act or determination of the Gas Referees.

(3) The local authority may, unless they are themselves the undertakers, appoint a competent and impartial person to be a Gas Examiner, and to test the gas at the prescribed testing-place, and to test the pressure at which the gas is supplied at the testing-place or elsewhere:

Provided that—

(*a*) for the purposes of this section a Gas Examiner may be appointed to act on behalf of any number of local authorities, and the local authorities may enter into such arrangements as they think fit in regard to the joint appointment and employment of such Gas Examiner;

(*b*) any county council may, if they think fit, with the consent of any such local authority within the county, appoint a Gas Examiner, who shall have the same powers as if he were appointed by the local authority.

(4) Where no Gas Examiner is appointed by the local authority, or by the county council, or where the testing of gas is imperfectly attended to, two justices, on the application of not less than five consumers, may appoint a competent and impartial person to act as Gas Examiner, who shall have the same powers and perform the same duties as if he were appointed by the local authority; and the remuneration and expenses of the Gas Examiner, up to an amount approved by the justices, shall be paid by the local authority.

POWER TO PRESCRIBE TESTS.

5.—(1) The Gas Referees may prescribe—

(*a*) the places at which, and the apparatus and method by which, tests, whether continuous or intermittent, shall be made to ascertain whether the undertakers are supplying gas in accordance with their obligations;

(*b*) the method by which any such apparatus shall be verified;

(*c*) the time and form of the reports to be made by the Gas Examiner to the Gas Referees and the local authority or justices by whom he is appointed, and the means by which the results of the tests shall be made available to the public.

(2) The prescribed apparatus shall, in the case of any undertakers who have manufactured in the preceding year more than 100 million c.ft. of gas, and in any other case in which it appears necessary to the Gas Referees, include a calorimeter for the production of a continuous record of the calorific value of the gas which is being supplied.

(3) Any undertakers with respect to whom an order has been made under this Act shall provide and maintain to the satisfaction of the Referees the prescribed testing-places and apparatus, and shall give any Gas Examiner access to any testing-place for the proper execution of his duty.

(4) A representative of the undertakers may be present on any occa-

sion on which the Gas Examiner inspects the testing apparatus or tests the gas, but shall not interfere with the inspection or tests.

(5) The Gas Referees may at any time for the proper execution of their duties enter upon and inspect any of the works of the undertakers; and the undertakers shall afford them and their assistants full facilities for this purpose, and shall furnish the Referees with such information with regard to the position of the mains and pipes of the undertakers, and with regard to any other matter, as the Referees may reasonably require.

Appeals to Chief Gas Examiner.

6.—(1) If the undertakers think themselves aggrieved by any prescription of the Gas Referees they may, within one month from the making of such prescription, appeal to the Chief Gas Examiner, who, after hearing the undertakers and the Gas Referees and any other body or person interested, may confirm, amend, vary, or annul the prescription; and the decision of the Chief Gas Examiner shall be final and conclusive.

(2) If the undertakers think themselves aggrieved by any report of a Gas Examiner, they may, within seven days, appeal to the Chief Gas Examiner, who may confirm, amend, or annul the report, and whose decision, after hearing the parties, shall be final and conclusive.

(3) The report of the Chief Gas Examiner or, if there is no such report, the report of the Gas Examiner showing a case of deficient calorific value, excessive impurity, insufficient pressure, or excess of incombustible constituents shall be conclusive evidence of the liability of the undertakers to a forfeiture in respect thereof.

Any report of the Chief Gas Examiner purporting to have been signed by him shall for all purposes and to all intents be *primâ facie* evidence of the due making and signing thereof, without proof of such signature.

Remuneration and Expenses of Gas Referees.

7.—(1) The salaries, remuneration, pensions, and gratuities of the Chief Gas Examiner and the Gas Referees and their assistants shall be such as the Board of Trade, with the consent of the Treasury, may fix.

(2) (*a*) Any such salaries, remuneration, pensions, or gratuities;

(*b*) any expenses of the Chief Gas Examiner and the Gas Referees in the execution of their duties or power under this Act;

(*c*) any expenses of the Board of Trade which in the opinion of the Treasury are directly attributable to the execution of their powers and duties under this Act;

shall be paid out of the fund established under this section:

Provided that during the first two years after the passing of this Act the expenditure for the purposes aforesaid shall, to the extent that may be necessary, be paid out of moneys provided by Parliament, but such payments shall be treated as advances, and shall be repaid out of that fund with interest at such rate as the Treasury may fix.

(3) Any undertakers with respect to whom an order under this Act has been made, and who in any year ending on the 31st of December have manufactured not less than 100 million c.ft. of gas shall, on or before the 1st of April in the following year, pay to a fund (to be called the Gas Fund) a contribution not being at the rate of more than £15 for each 100 million c.ft. of gas so manufactured by them; and the Treasury may determine that that fund shall be a public fund within the meaning of the Superannuation Act, 1892.

(4) The Board of Trade shall not later than the 15th of January in each year prescribe the rate at which such contribution shall be payable for that year (which shall not exceed the rate reasonably required to meet the estimated expenditure for the year), and the manner in which and the account to which the contribution shall be paid; and the amount payable by the undertakers shall be a debt due by the undertakers to the Crown, and shall be recoverable accordingly with costs.

(5) The Board of Trade shall as soon as may be after the 31st of March in every year cause the accounts of the Gas Fund for the preceding year to be laid before Parliament.

FORFEITURE AND PENALTIES.

Penalties for Failure to Comply with Prescription of Gas Referees.

8.—If the undertakers fail to comply with any lawful prescription of the Gas Referees, or to provide or maintain any testing-place, apparatus, or materials, or any other matter or thing prescribed therein, or to afford to the Gas Examiner or Gas Referees access to any testing-place or works, or to afford or furnish to them or their assistants any facilities or information in accordance with the requirements of this Act, the undertakers shall be liable on summary conviction to a fine not exceeding £50, or in the case of a continuing offence £50 for each day during which such failure continues:

Provided that no proceedings under this section shall be taken—

(*a*) unless the Board of Trade, after giving the undertakers an opportunity of being heard, consent thereto;

(*b*) in the case of the offence or failure to comply with any lawful prescription until after the expiration of the period within which the undertakers may under this Act appeal against the prescription;

(*c*) if the undertakers have appealed as aforesaid, unless or until either such appeal is withdrawn or the Chief Gas Examiner has given a decision thereon.

Forfeiture for Deficient Calorific Value, &c.

9.—(1) If on any day for a period of two hours or upwards the calorific value of the gas supplied by any undertakers ascertained in accordance with the provisions of this Act is more than 5 p.ct. below the declared calorific value, the undertakers shall be liable on summary conviction to a forfeiture not exceeding £5 for every complete 1 p.ct., by which the calorific value is deficient.

(2) If on any occasion the gas does not conform to the provisions of this Act, or any order made thereunder, as to composition and pressure, the undertakers shall be liable on summary conviction to a forfeiture not exceeding £10.

(3) The undertakers shall not be liable to any forfeiture under this sub-section in any case where they show that the deficiency or failure was due to circumstances not within their control.

(4) If in any quarter the average calorific value of the gas supplied by any undertakers, ascertained in manner prescribed by the Gas Referees, is less than the declared calorific value, a sum which the Chief Gas Examiner shall determine to be as nearly as may be the amount by which the revenue of the undertakers has been improperly increased shall—

(*a*) if the undertakers are a local authority, be applied towards a reduction in the price of gas in the next or some succeeding quarter;

(*b*) in any other case, be deducted from the divisible profits; and the dividend which the undertakers may pay on their ordinary capital shall be correspondingly reduced.

For the purposes of this provision, the expression "quarter" means the three months commencing on the 1st of January, the 1st of April, the 1st of July, and the 1st of October in any year.

(5) Proceedings against the undertakers in respect of any forfeiture incurred under this Act may be commenced at any time within six months after the date of the report of the Gas Examiner, or after the date of the report of the Chief Gas Examiner on appeal, or in the event of the undertakers duly appealing to the Chief Gas Examiner and withdrawing the appeal within six months from the date of the receipt of notice of such withdrawal.

(6) If, on an appeal to the Chief Gas Examiner, he certifies that the default of the undertakers is not substantial or not due to the careless conduct of the undertakers or of their servants, no summary proceedings shall be taken in respect of the default. But the Chief Gas Examiner may by order determine the amount of the forfeiture to be paid by the undertakers; and any such order shall have effect as if it were an order of a Court of Summary Jurisdiction.

SPECIAL ORDERS.

Power to Make Special Orders.

10.—(1) Anything which under the Gas and Water Works Facilities Act, 1870, or any Act amending the same, may be effected by a Provisional Order confirmed by Parliament may, so far as those enactments relate to gas, be effected by a special order made by the Board of Trade under and in accordance with the provisions of this section.

(2) Without prejudice to the generality of the powers conferred by this section the Board of Trade may, by any such special order—

(*a*) Empower any authorized undertakers to obtain a supply of gas in bulk from any source whether situated within or without their authorized limits of supply;

(*b*) Empower any authorized undertakers to give a separate supply of gas for industrial purposes within their authorized limits of supply;

(*c*) Authorize arrangements for the joint working or amalgamation of undertakings including necessary provisions with regard to the capital of the combined undertaking, the vesting in the combined undertaking of the property and rights of the amalgamated undertakings, and other necessary incidents and consequences of amalgamation or joint working;

(*d*) Authorize the raising of capital or the borrowing of money for any of the purposes aforesaid;

(*e*) Modify or amend the provisions of any Special Act or other provision relating to the undertaking affected by the special order as may be necessary to provide for the proper and efficient conduct of the undertaking.

(3) Sections 80 and 81 of the Factory and Workshop Act, 1901, which relate to the making of regulations under that Act, as set out and adapted in the Schedule to this Act, shall apply to the making of special orders under this Act.

(4) Before any special order under this Act comes into force, it shall be laid before each House of Parliament for a period not less than 21 days during which that House is sitting, and if either of those Houses before the expiration of those 21 days presents an address to His Majesty against the order or any part thereof no further proceedings shall be taken thereon, without prejudice to the making of any new order.

GENERAL.

Fees for Examination of Meters.

11. The fees for the examination, comparison, and testing, with or without stamping, of meters, shall be such as may be determined from time to time by the Board of Trade, and section 19 of the Sale of Gas Act, 1859, is hereby repealed:

Provided that the fees fixed by the said section shall, notwithstanding such repeal, continue to be chargeable unless and until altered by the Board of Trade under the powers conferred by this section.

Application of s. 6 of 4 Edw. 7. c. 28.

12.—(1) The powers and duties of the Board of Trade under section 6 of the Weights and Measures Act, 1904, in relation to certificates of suitability for use of certain appliances, shall extend to instruments for measuring gas and patterns thereof, and that section shall have effect accordingly:

Provided that for the purposes of that section as applied by this section the expression "inspector" shall mean an inspector of gas-meters under the Sale of Gas Act, 1859.

(2) The powers of the Board under section 5 of the said Act to make regulations with respect to measuring instruments shall include power—

(*a*) to make regulations with respect to any instruments of a pattern certified by the Board of Trade in pursuance of the powers conferred by this Act;

(*b*) to make general regulations for carrying into effect the provisions of this section in relation to instruments of a pattern so certified.

Accounts and Returns.

13.—(1) All gas undertakers shall furnish the Board of Trade at such times and in such form and manner as the Board may direct

an annual account, and such statistics and returns as the Board may require.

(2) Within 7 days of the date on which the annual account is sent to the Board of Trade the undertakers shall furnish a copy thereof to the local authority, and shall place copies on sale at their principal office at a price not exceeding 1s. per copy.

(3) If any undertakers fail to comply with the provisions of this section they shall be liable on summary conviction to a fine not exceeding 40s. for each day during which the default continues.

(4) The provisions of this section shall be substituted for the provisions of section 35 of the Gas-Works Clauses Act, 1871, in so far as such provisions are incorporated in the Special Act of the undertakers.

POWER TO MAKE RULES.

14.—(1) The Board of Trade may make rules in relation to applications and other proceedings under this Act, and to the payments to be made in respect thereof, and to the publication and service of notices and the publication of advertisements, and the manner in which and the time within which representations or objections with reference to any application or other proceeding are to be made, and to the holding of inquiries in such cases as they may think it advisable, and to the costs of such inquiries, and to any other matters arising in relation to their powers and duties under this Act.

(2) Any rules made in pursuance of this section shall be laid before Parliament as soon as may be after they are made, and shall have the same effect as if enacted in this Act.

EXERCISE OF POWERS OF BOARD OF TRADE.

15.—All things required or authorized under this Act to be done by the Board of Trade may be done by the President or Secretary or Assistant Secretary of the Board, or any person authorized in that behalf by the President of the Board.

DEFINITION OF LOCAL AUTHORITY.

16.—For the purposes of this Act, the expression "local authority" means any sanitary authority or parish council of any borough, district, or parish within or partly within the limits of supply of the undertakers.

SHORT TITLE.

17.—This Act may be cited as the "Gas Regulation Act, 1920."

SCHEDULE.

PROVISIONS OF THE FACTORY AND WORKSHOP ACT, 1901, APPLIED TO SPECIAL ORDERS MADE UNDER THIS ACT.

80.—(1) Before the Board of Trade make any special order under this Act, the undertakers concerned shall publish, in such manner as the Board may think best adapted for informing persons affected, notice of the application of the order, and of the place where copies of the draft order may be obtained, and of the time (which shall be not less than 21 days) within which any objection made with respect to the draft order by or on behalf of persons affected must be sent to the Board of Trade.

(2) Every objection must be in writing and state—

(*a*) the specific grounds of objection;

(*b*) the omissions, additions, or modifications asked for.

(3) The Board of Trade shall consider any objections made by or on behalf of any persons appearing to them to be affected which is sent to them within the required time.

(4) When the Board of Trade do not amend or withdraw any draft order to which any objection has been made, then (unless the objection either is withdrawn or appears to them to be frivolous) they shall, before making the order, direct an inquiry to be held in the manner hereinafter provided, and may, after considering the report of the person who held the inquiry, make the order either without modification or subject to such modification as they think fit, or may refuse to make the order.

81.—(1) The Board of Trade may appoint a competent and impartial person to hold an inquiry with regard to any draft order, and to report to them thereon.

(2) The inquiry shall be held in public; and any objector and any other person who, in the opinion of the person holding the inquiry, is affected by the draft order, may appear at the inquiry either in person or by counsel, solicitor, or agent.

(3) The witnesses on the inquiry may, if the person holding it thinks fit, be examined on oath.

(4) Subject as aforesaid, the inquiry and all proceedings preliminary and incidental thereto shall be conducted in accordance with rules made by the Board of Trade.

(5) The fee to be paid to the person holding the inquiry shall be such as the Board of Trade may direct.

SIXTY YEARS AGO.

[From the "Journal" for May, 1860.]

A Disastrous Fire.—The announcement by the Chairman of the Great Central Gas Company, that claims have been made on them amounting to between £60,000 and £70,000 for damages sustained on the occasion of the recent fire in Wood Street, Cheapside, and which is alleged by the insurance offices and others to have been caused by the unskilful manner in which the preparations were made for laying a service-pipe into the premises from the Company's mains, is a subject of great importance to gas companies. As the matter will probably undergo investigation in a Court of Law, we refrain from any remarks upon the merits of the case, and refer our readers to the *ex parte* evidence adduced upon the inquiry before the Coroner. We may, however, draw the attention of gas companies generally to the subject, as it is a liability to which they are all exposed; and, if a precedent for a claim of this nature be once established, it may materially affect the value of gas property, as fire insurance companies will naturally use it as a means of avoiding loss themselves, wherever there may have been an escape of gas from any defect in a main or service-pipe, on the ground that it was the duty of the gas company to have prevented it.

Slate for Purifiers.—Mr. George Walcott writes: Having erected several large and small gas-works in the slate districts of North Wales, it has often occurred to me that slate might be very advantageously used, instead of cast iron, for the cases of purifiers. Twice within the last few years I went to a slate-yard at Bangor, and inquired prices of corresponding slate cisterns. I found that slate cased purifiers would cost considerably less than cast-iron cased purifiers. The proprietors of the slate-yard readily undertook to make some slate purifiers, after my having described their make to them.

Universal Lime-Light.—The "Universal Lime-Light" has ceased to illuminate Westminster Bridge. We believe the promoters of the Company give out that, having practically demonstrated that a uniform light can be maintained, they have suspended the experiment to make preparations for the manufacture of oxygen gas by another process, which it is alleged will much reduce its cost. It may be taken for granted that the attempt to manufacture it from the revivified peroxide of manganese has failed.

The Sale of Gas Act.—The delay of the Government officials in depositing the standard gasholders and apparatus at the Exchequer Office is not the most serious obstacle to putting the Sale of Gas Act into operation. Opposition has been unexpectedly raised to it in various parts of the kingdom on account of the expense of providing the requisite apparatus and offices in rural districts, where there are few gas consumers. Foremost among these opponents is Earl Cathcart, who, in his capacity of Chairman of the North Riding Quarter Sessions, has written to the Home Secretary, to remonstrate against being compelled to put the Act into effect in that division of the county of York. His Lordship states that there are only about 2500 gas-meters in the whole Riding, or one meter to a square mile; that the mass of ratepayers have no interest in gas; and that if compelled to carry the Act into operation, it will be requisite to order and keep in repair eighteen copies of the standard instruments, at a cost of £1620, to hire as many rooms to keep them in, and to pay the salary and travelling expenses of the inspector; while the estimated fees to meet this expenditure would not amount to more than £187.

PERSONAL.

As Mr. R. G. SHADBOLT intends to devote himself to private practice, he is, as from June 30, relinquishing the offices of Manager and Secretary to the Grantham Gas Company, but will retain the position of Consulting Engineer. His son ERNEST (at present Assistant to his father, by whom he has been trained) has been appointed to succeed him in the two offices he is vacating. Mr. Shadbolt has been asked by the Skegness Urban District Council to report upon their gas undertaking.

Mr. ALEXANDER MAITLAND, who recently retired after the long period of 64 years' continuous service with the Greenock Corporation Gas Department, has been presented with a suit-case, travelling bag, and wallet of Treasury notes. In making the presentation, Mr. George Keillor (the Engineer and Manager) remarked that Mr. Maitland had shown himself to be a man of character and courtesy; and it was proof of the value of his services to the community that he had been asked to continue them in an advisory capacity. Advancing years and declining health had, however, unfortunately made this impossible. They all wished him every happiness in his well-deserved retirement. It may be added that Mr. Maitland served under six different managers at Greenock, and was foreman of the main and service pipes section for fully thirty years.

OBITUARY.

The death occurred, with tragic suddenness, on Saturday, the 15th inst., of Mr. JOHN EDWARD SUTTON, the Assistant Manager of the Valley Road gas-works of the Bradford Corporation. Mr. Sutton, who was 43 years of age, was one of the most popular members of the staff. Up to the Thursday night he was engaged in his usual occupations, and apparently in good health; but on the Friday morning he was taken ill, and died next day, after an operation. He was a member of the Yorkshire Junior Gas Association, and had been engaged in the Bradford Gas Department for 27 years. At the funeral, at Undercliffe Cemetery, last Tuesday, there was a very large attendance.

In a paper on the "Hydrogenation of Naphthalene," which he read before the Manchester Section of the Society of Chemical Industry, Mr. F. M. Rowe, M.Sc., A.I.C., of the Manchester College of Technology, discussed the formation of hydrogenated derivatives of naphthalene by the action of hydrogen in the presence of a catalyst. Attention was drawn to the fact that tetrahydro-naphthalene and dekahydro-naphthalene, which are valuable solvents and motor fuels, are now available in Germany in large quantities, being manufactured by the direct hydrogenation of naphthalene.

PATENT "THERM" UPRIGHT GAS-BURNER.

To Displace Flat-Flame Burners with Any Grade Gas—No Alteration of Fittings Required.

The gas industry is on the brink of a great change. If all goes well, it will soon have power to sell gas on the heat-unit basis. As we ascend in thermal efficiency in relation to the coal carbonized, through the production of more B.Th.U. in gaseous form, the farther will the gas recede in the matter of luminosity *per se;* but the cheaper will be the thermal units placed at the disposal of the householder and the manufacturer. This in most gas-supply areas will mean the final abandonment of the flat-flame burner. And a very good thing, too, provided a burner is available that can supersede, with economy, the flat-flame burner, without any alteration of fittings, and will stand hard wear.

Progress in economy and efficiency in the industry and for the nation must not be delayed by consumers who have lingered behind in converting their old gas-burners to the more scientific mode of gas lighting; and compulsory conversion will be to the advantage of such consumers. They will be far better off in pocket and in illumination with incandescent burners than with flat-flame ones, even if the latter were supplied to them for nothing. It is generally estimated that, of the total consumption of gas in the United Kingdom (which, taking statutory and non-statutory undertakings, we may put approximately at 240,000 million cubic feet), only 5 p.ct. is used to-day in flat-flame burners. But 5 p.ct. of this enormous total consumption of gas means 12,000 million cubic feet; while the same amount of illumination should be obtained in the incandescent way by at most one-sixth part of this quantity of gas, or (say) 2000 million cubic feet. If we take an average of 12,000 c.ft. of 14-c.p. gas as being produced per ton of coal, the consumption of gas by flat-flame burners means the carbonization of about 1 million tons of coal a year, while 2000 million cubic feet of gas would not, on the same basis of production, require more than 170,000 tons, and, with the processes for increasing the production of B.Th.U. per ton of coal handled, the 170,000 tons will be still further reduced. Therefore, the displacement of the flat-flame burner is a national advantage, besides being an economy to the user.

The New "Therm" Burner.

The displacement of the flat-flame burner calls for an incandescent burner that will (without requiring any new and, to-day, expensive fittings) give about an equal illumination, a burner that is strong, one that is (as things go) reasonably cheap, and one that will in these times of high-priced gas produce considerable economy compared with a flat-flame burner, and certainly one that will be more sightly. For displacing flat-flames, and for use with low-grade gas, poor-looking burners with swaying mantles would not add to the reputation of gas, and no gas undertaking should recommend or countenance their employment.

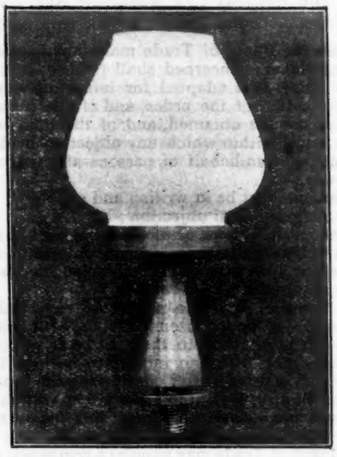
Now we have before us the first of a series of burners which have been designed and patented by Messrs. F. G. Gorman and J. E. Smiles, and which burners are being placed on the market by the "Therm" Gas-Burner Syndicate, Ltd. (Mr. A. J. Kingdon, Secretary), of Suffolk House, Laurence Pountney Hill, E.C. The first burner which will be marketed is the smallest of three, and is intended to replace flat-flame burners in such positions as halls, passages, corridors, lavatories, bath-rooms, cellars, and so on, where a moderate illumination is sufficient, and (to ensure economy) a low consumption of gas is desirable—a burner which will prevent waste, and at the same time render all the service necessary. This burner, too, is highly useful for decorative purposes. It can be supplied with or without galleries for globes; normally it will be supplied without. But a stock of galleries can always be kept by gas undertakings to be supplied with those burners that are to be used for buildings, shop windows, or other places where, for appearance and decorative effect, a globe is required. Used in clusters, on separate branches, with suitable globes, a highly artistic effect is secured; and this form of lighting should have a good demand for shop windows and for drawing-room purposes. With a reflector reading-lamp, the patent "Minor-Therm" burner (as the smallest one is called) makes a useful combination. Prepayment consumers particularly will welcome it, where flat-flames are now used.

An Inverted Mantle and Special Nozzle on an Upright Burner.

There are four essential points about a burner, the primary purpose of which is to displace flat-flame burners. It must be a strong burner, easily maintained, capable of regulation when in use, and must be economical. The "Therm" burner is all this; and, moreover, it has a peculiarity which is the chief feature of the patent. It is an upright-burner, on which is used an inverted mantle specially made for it; and the fire-clay nozzle and mantle are supplied as one. The ordinary mantle ring is dispensed with. The nozzle itself forms the burner ring; and the nozzle has been so designed and shaped that the flame is evenly spread over the mantle. It looks somewhat peculiar, as the illustration shows, to have a fixed inverted mantle on an upright burner; but it is a logical development from the trend of things in the gas industry. With the lower-grade gas, and lessened requirement of air for complete combustion, shorter and more intense flames result; and the ordinary long upright mantles will, as time passes, find that they are useless with the new grades of gas, as it will be impossible to get a sufficient length and body of flame to fill them, without fundamental changes are made in the burners.

Moreover, it will be readily appreciated that with this burner, compared with the ordinary upright one, there will be a material saving of mantles and globes, which is, with mantle and globe prices high, a consideration when we are talking of displacing open-flame burners. The old prop-supported upright mantle, in swaying about through vibration and draught, soon had its skirt seriously frayed, cracks resulted, and it was difficult to get the mantle to hang permanently centrally over the flame. In places where there are draughts—such as halls, landings, and passages—

The "Minor-Therm" Burner.



The "Minor-Therm" Burner with Opal Globe.

the destruction of upright mantles, and consequently globes, was great. Furthermore, one is required to be expert in hanging a mantle on the prop support; and the upright mantles that have met destruction before getting into active service are legion. The mantle and nozzle being supplied as one, all that the consumer has to do is to slip the new nozzle on to the burner tube, and the mantle is there—firmly in position, and no chance of swaying or getting out of the centre, nor can any part of the mantle escape flame contact.

Ready Application and Economy of the "Therm" Burner.

The foregoing are distinct advantages. Now as to the burner itself. Being an upright burner, it will require no new fittings in displacing flat-flame burners; and though it will not give in the lower hemisphere the same lighting efficiency as the inverted burner and mantle, many consumers and for many purposes will find compensation in the fact that the fittings will not become discoloured through the influence of the hot products of combustion. The "Minor-Therm," the first of the series of the burners being put on the market, is, as previously explained, not intended (individually used) for a working unit, so much as for giving quite a moderate light where such light is required, or for decorative effect. The "Medium-Therm" and the "Major-Therm" will be working units, when ready for the market. Economy and efficiency with low-grade gas at (contrasted with pre-war times) a high price, is obtained by the burner. With gas of about 475 B.Th.U. gross, three of the "Minor-Therm" burners show the following consumptions at the pressures named.

Pressure.	Burners.						Average.
Inches.	No. 1. C.Ft.		No. 2. C.Ft.		No. 3. C.Ft.		C.Ft.
2 . . .	0·85	...	1·00	...	0·90	...	0·92
3 . . .	1·00	...	1·20	...	1·10	...	1·10
4 . . .	1·15	...	1·35	...	1·25	...	1·25

It may be taken from these tests, that where the price of gas is 3s. per 1000 c.ft., 28 hours' lighting can (at 2 to 3 inches pressure) be obtained for 1d.; where gas is sold at 4s. per 1000 c.ft., 20 hours' lighting can be obtained for 1d.; and where the price of gas is 5s. per 1000 c.ft., 16 hours' lighting can be obtained for 1d.

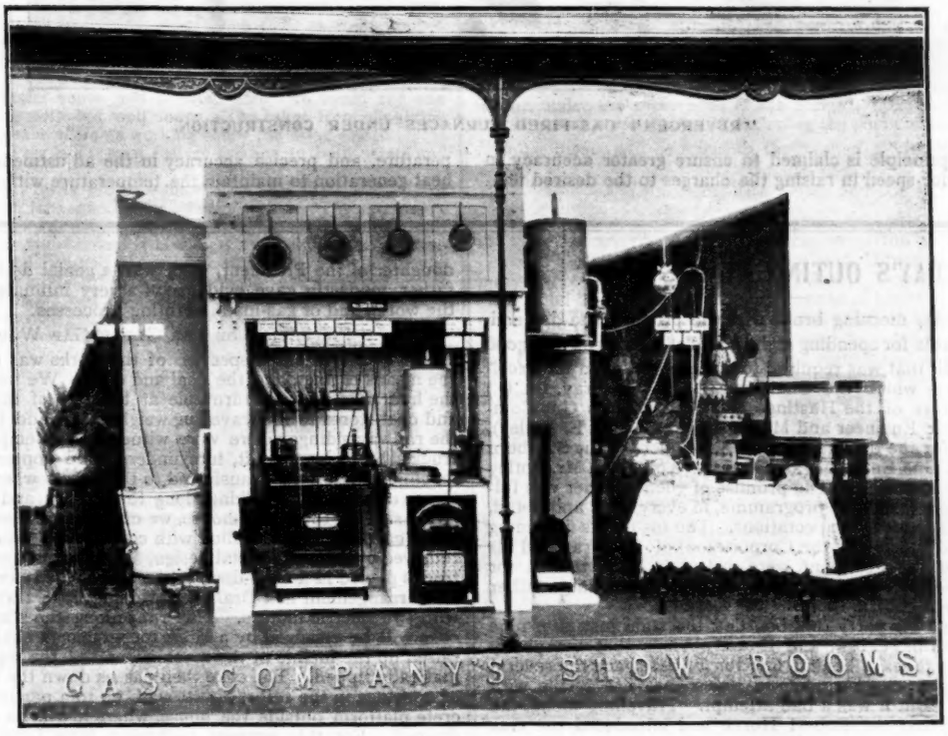
We have not available illumination tests of these "Minor-Therm" burners; but with the small-size burners, it will be appreciated that suitability to purpose and economy were the main points aimed at in securing a burner that gas undertakings could adopt to replace flat-flame burners. There will be more talk of lighting efficiency per cubic foot when the "Medium-Therm" and the "Major-Therm" are ready for the market.

STRENGTH AND SIMPLICITY OF BURNER, AND EASY REGULATION.

The length of the life of these burners is an unknown quantity, because there is nothing about them that is destructible. The overall length of the "Minor-Therm" burner is 2½ inches, including the screw; but the bunsen tube itself is only 2 in. long. The tube is seamless; being turned-out of stout brass tube. The main part of it is conical; so that the larger part of the base forms a mixing-chamber. The screw for connecting with the gas-fitting is in one piece with a circular plate, which has four equi-distant air apertures in it, and centrally the gas-inlet. By friction fit this fixes firmly into the base of the tube. On the screw is a circular milled-edge disc regulator, which gives a large range of air-adjustment; and so regulation can be made when the burner is in use without burning the fingers. On top of the burner tube is a gauze cap; and here the nozzled mantle is placed. From this description, it will be seen that the burner is simple, strong, and of good appearance; every part is interchangeable; and the range of gas quality that can be used with it is considerable.

The patent covers various modifications and sizes of burner, which we anticipate, with the lower-grade gas now being and to be supplied, will have considerable adoption, as even for a burner to supplant flat-flame burners for ordinary purposes, the gas industry must have one that is good from all points of view, and shoddy ill-designed burners must be banned.

AN ALL-GAS HOUSE EXHIBIT.



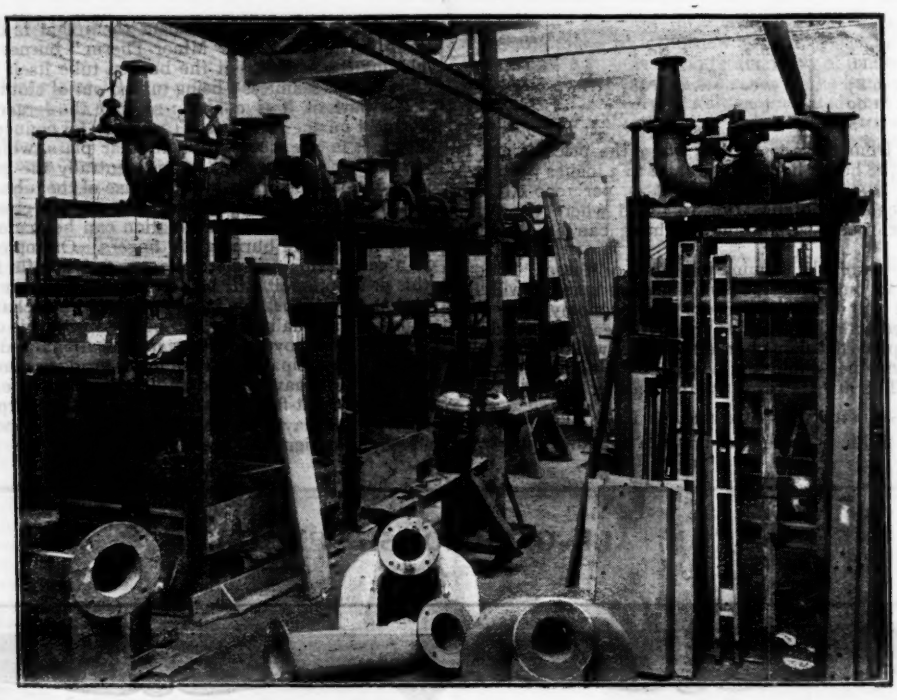
LARGE crowds of keenly interested spectators have been attracted to the show-room window of the Bournemouth Gas and Water Company by an All-Gas House exhibit which has been prominently displayed there. For the photograph of the exhibit which is reproduced here we are indebted to Mr. Philip G. G. Moon, the Engineer and General Manager of the Company. The interest thus evoked will in due course assuredly bring material advantage to the undertaking.

"REVERGEN" TOWN-GAS FURNACES.

THE photograph appearing on the next page, which was taken at the Luton works of the Davis Furnace Company, is of a number of "Revergen" furnaces in course of erection for Wolseley Motors, Ltd., from whom the Company have received an order for ten of these furnaces.

Readers of the "JOURNAL" have already been made acquainted with the Davis "Revergen" principle of firing-furnaces with town gas, by means of which heat losses by way of the furnace flue or flues are reduced to an insignificant minimum; and the thermal energy thus recovered is utilized almost exclusively for the practical purposes of the furnace. The flue gases of a "Revergen" oven-furnace 4 ft. 6 in. by 3 ft., consuming 370 c.ft. of gas per hour, and maintaining an oven temperature of 1050° C., did not, it is said, exceed 65° C., at which temperature only from 2 to 2½ p.ct. of the heat generated by the gas consumed will be carried off. The heat-absorbing materials in the regenerator chambers are first heated by the escaping products, and are then cooled by the incoming air. While one heat reservoir is being cooled, the other is being heated by the escaping gases—thus reducing their temperature and retaining the heat until it is, in turn, taken-up by the incoming air. The air is in this way heated on its way to the furnace; the continuation of the inversion process resulting in the production of a higher flame temperature, with an accompanying increase of efficiency within the furnace, over and above that accomplished by the effective recuperation of the heat of the escaping gases.

In addition to the economy of the system from a fuel point of view, it permits of the construction of a furnace capable of withstanding the highest temperatures and repeated temperature changes; and the furnace can be manipulated by an entirely unskilled operator. When compared with coal-fired furnaces, the



"REVERGEN" GAS-FIRED FURNACES UNDER CONSTRUCTION.

"Revergen" principle is claimed to ensure greater accuracy in control, superior speed in raising the charges to the desired temperature, and precise accuracy in the adjustment of the rate of heat-generation to maintain the temperature without fluctuation.

A DAY'S OUTING AT HASTINGS.

Last Thursday morning broke with the promise of a day eminently favourable for spending eight hours at Hastings; and good weather was all that was required to put the seal upon the excellent programme which the Chairman (Dr. G. G. Gray, LL.D.) and the Directors of the Hastings and St. Leonards Gas Company, with their Engineer and Manager (Mr. Charles F. Botley), had arranged for the delectation of the members of the Southern Association of Gas Engineers and Managers, of which Mr. Botley is the popular President. The promise of good weather was fulfilled throughout; and the programme, in every item and detail, as it developed exceeded expectations. The 105 guests (including the Mayor and officials of the Corporation) of Dr. Gray and his colleagues and the President, were ardent in their thanks for what was done for their enjoyment, and grateful to the weather for its beneficent contribution.

It was quite a big party that boarded the train just after nine o'clock at Charing Cross; and it was obvious that everybody was attempting to leave behind him for a brief space the several cares of a gas manager's office in times that are fertile with much anxiety. But it was a bad attempt. Travelling along, the announcement that Sir Robert Horne had introduced the Gas Regulation Bill gave rise to discussion as to what the Bill contained; coal prices and stocks had an innings; and the labour question and the ballot of gas workers came under review. Then the fresh aspect of the country through which we were passing claimed attention; and a few minutes after eleven o'clock we drew up at the West St. Leonards station, where were found the President and Dr. Gray waiting to give a handshake to their guests, and to escort them to the Company's Glyne Gap works, which capped the life's engineering work of Mr. C. E. Botley, and largely inaugurated the responsibility of the President in that direction, for he had considerable part in designing them. Fine motor conveyances transferred the visitors from the station to the works; and these were in attendance throughout the day. There was an invigorating nip in the air as we drove along the road, catching here and there glimpses of the sea. At the works were found a number of other members who had come from the west, as well as from southern places along the lines of the L.B.&S.C. Railway. And we also quickly came into contact with other members of the Board of the Company. This enables mention to be made at once that during the day we had the pleasure of meeting in addition to Dr. Gray, the Deputy-Chairman (Major Stanley Weston), Mr. A. Apel, Mr. W. E. Brown, Mr. W. J. Glenister, Mr. E. R. Mansell, and Mr. Macer Wright —all of whom were indefatigable in adding to the pleasure of the day. Among the big gathering was also found Mr. T. H. Martin, long years since of Barnet, and now living in retirement at Hastings. He could not miss the opportunity of conveniently seeing several of his old friends. We were divided into parties and conducted round the works, the guides being Dr. Gray, the President, members of his staff, and there was Miss Molly Botley, daughter of the President, who, with a genial desire to help her father, modestly gave evidence of a very intimate knowledge of the works and of gas-manufacturing processes.

Inspection of the Glyne Gap Works.

The course of our inspection of the works was first to witness the means of handling the coal and coke. We were elevated by the hydraulic lift and turntable at the end of the retort-house and coal-stores to the travelling weighbridge, and this took us to the railway sidings where were witnessed the emptying of coal-trucks, by hydraulic lift, into underground hoppers whence the incoming material is transferred to the points where it is desired to use or store it. Walking along the sidings and round to the other side of the retort-house, we came across new work that is being carried out for dealing with coke. At present the coke is removed by skips of special design, and quenched and loaded into trucks placed in a coke-dock at the end of the retort-house. The new arrangement is a Drakes' traversing coke transporter, fitted with two electric motors. This runs along the stage-floor. The coke will be received by a large receptacle (a charge at a time), raised up the incline of the machine, and at the top will be automatically tipped. The coke then passes down the inclined floors of openings in the retort-house wall, on to a partially paved concrete platform outside the house, where it will be quenched and drained. For this purpose perhaps a little incline to the top of the staging would have facilitated the escape of the moisture. There is rather an unpleasant noise when the machine is in operation, due it is believed to the steel gearing; but it is understood that there is hope of overcoming this. The retort-house was thoroughly inspected, and then the power house came in for a visit. In this building all the power plant—gas, electrical, and hydraulic—is grouped. The magnificent purifier house also came in for much attention; and the laboratory and other parts of the works were explored. But we need not go into detail, because Mr. Botley had thoughtfully provided the visitors with the following notes, which we give *literatim*. It will be remarked that they are given in the form of "Notes," and are not intended to be anything else:

Site.—Twenty acres in extent on the main road between Hastings and Bexhill and alongside the L.B.&S.C. Railway. In the parish of Bexhill, and the Bexhill Gas-Works are within half-a-mile. Approximately the centre of the Company's original area of supply (which included Bexhill).

Design.—The original conception was for the supply of light, power, and heat for the district; and four sections, with an ultimate maximum capacity of 8 millions per diem, were contemplated. The position has, however, changed since 1899.

Sidings (incomplete).—Approximately one mile. At one end connected with a travelling traverser weighbridge. Access is given to the yard or coal-stores at the east end by means of a hydraulic lift and turntable. At the opposite or Bexhill end there is a connection to the yard level (undeveloped).

Coal-Stores.—Maximum capacity, 4000 tons. There has been much trouble during the war with fires from spontaneous combustion. Has two lines of rails with a cross conveyor and end truck tipper

(outside); also coal-breakers and elevators to the retort-house bunkers. There are overhead water-tanks; the roof being of an unusual type. Below the coal-stores are water-tanks, and at the end the shift men's lobbies. At the east end are motor-driven hydraulic pump and accumulator for the section.

RETORT-HOUSE.—The glazed louvre has proved expensive in maintenance. Stage-floor type, equipped with West's compressed air machinery, De Brouwer electrically driven projector, and Arrol-Foulis hydraulic coke discharger; also a Drakes' coke-transporter. A combined charger and discharger, electrically driven, is contemplated. Coke is removed by skips of special design and quenched and loaded into trucks placed in the coke dock at the end of the house. The overhead coal-hoppers have a capacity of 400 tons. There are tar-towers, one to each bench, with two retort-house governors per bench. In connection with the coke-transporter, an alternative method of dealing with the coke is proposed. The stage which will serve for quenching and screening is the same height as the vehicles or trucks, which can thus be loaded with facility alongside. There is no stocking of coke as a rule, excepting in the 8-ton (obsolete) coal wagons, of which the Company have a number. The standard working has been 12,000 c.ft. per ton, with 9 cwt. charges, burnt off in eight hours—corresponding to 8100 c.ft. per mouthpiece a day. The original regenerators (Winstanley's) are, with one exception, in use. The beds under fire have been in use for from 768 to 1805 days. There are eighteen 20 ft. through beds of eights.

CONDENSERS are of the water-tube type, and reversible. Some pumps are temporarily placed alongside. There is a tar and liquor tank below the condenser, and a liquor supply tank over same.

BOILER-HOUSE, with a water-tank above of 90,000 gallons capacity. The house is at present fitted with two Thompson 30 ft. by 8 ft. 6 in. dish-ended Lancashire boilers; and a 24 ft. by 7 ft. Lancashire boiler from the old works. Steaming has not of recent years been satisfactory. Provision is made for a Green's economizer, and for induced draught; and the chimney is 130 ft. high, of special design. In an extension of the building, the liquor concentrating plant is for the time being accommodated. The pump-room is centrally placed for the two sections of the boiler-house, and is fitted with two steam and one motor-driven pump with hot well under. The ashes from clinkering are removed by means of trams working below the firing-floor.

PIPE ALLEY.—This is a special feature tending to both safety and convenience.

MACHINERY OR POWER HOUSE—the "heart" of the works. Over this is a large room for recreation or other purposes. The machinery is as follows: Two pairs of 60,000 c.ft. exhausters (which serve from the retort-house into the holders at Hastings); two single-line air-compressors; one 55-KW. 500-volt gas-driven electrical set; one duplicate, steam driven; one motor-driven air-compressor; one small gas-engine driven air-compressor; one 100-H.P. Daimler gas-engine to be direct-coupled to the electrical generator; a motor balancer for giving a lower voltage of 220-250; combined hydraulic pumping engine with accumulator (outside); 13-KW. direct-coupled gas electrical set (out of use); a gas-compressor in connection with the carburetted water-gas plant; two Tangye-Archer high-speed vertical engines driving Sturtevant fans; 100,000 exhauster for the carburetted water gas plant, driving an air-compressor (purification). A 100 H.P. suction-gas plant is on order for erection on the north side of the building.

MECHANICAL PURIFICATION PLANT.—Pelouze-Audouin tar-extractor; Walker's complete purifying machine; Kirkham "Standard" washer; Holmes's scrubber-washer; rectangular tower scrubber for benzol recovery. [The working results in regard to the ammonia plant are not satisfactory.]

BENZOL PLANT of the Carr type; temporarily out of use.

PURIFIERS.—The results of enforced wartime neglect will be noted. There are seven purifiers, 32 ft. by 40 ft. by 6 ft. Purifier for coal gas is a continuous box of special design. The covers are two per box; leaving the whole area unobstructed when discharging or refilling. Boxes run very long periods, except No. 1, as will be seen from the following figures:

No.	2	has been in use	420	days.
"	3	" "	107	"
"	4	" "	489	"
"	5	" "	751	"
"	6	" "	409	"

Thus the bolting of the covers is satisfactory. There are six purifiers from the old works for carburetted water gas. In the ordinary way only oxide is used. There has been trouble with the material supplied during wartime. At the west end a hydraulic lift enables the trams to be taken up and down, and an oxide disintegrator is being installed. The corrugated sheet-iron roof will gradually be replaced by material of a more durable character.

METERS.—The coal gas is measured by a 100,000 c.ft. per hour rotary meter, which can be checked in series by the station meter, which is used for carburetted water gas. To relieve the accumulated pressure at the time of maximum output, it is proposed to instal a booster fan on the outlet of these meters. At the Hastings works exhausters are already provided for a somewhat similar purpose. [The carburation process for the prevention of naphthalene is in use at the Hastings works, treating the gas as distributed.]

LABORATORY.—Not yet fully equipped, but has test holders with photometric apparatus, dark room, &c.

C.W.G. PLANT.—This has some interesting features. There are two relief holders; one being originally intended for power gas. The oil-storage tanks, which were originally at Hastings, have a capacity of 60,000 gallons. Separators are in duplicate, with overhead supply tanks, and there are three condensers—horizontal frictional air, vertical water-tube, and a horizontal M. & C. The generators have a nominal capacity of 600,000 c.ft. per diem; but under war conditions the production has fallen. Part of this plant, including the roof of the building, was removed from the old works. A spare or duplicate generator is provided, which enables both sets to be kept at work when necessary. The air-blast mains are fitted with a simple safety appliance; steam meters and electric pyrometers are being installed. The carburettors are of a special type; the oil being supplied in the form of mist, with the result that the chequer work keeps comparatively free from carbon, and a uniform quality of gas is produced with a minimum of tar. The work of the carburettors is so effective that the superheaters are more or less superfluous. Coke can be delivered direct to the generators if required. The standard working was 6000 c.ft. per run, with 4 p.ct. maximum of CO_2, and 7 to 8 candles per gallon of oil used.

Blue water gas is frequently made; the calorific value of it being 300 B.Th.U. gross. The coke consumption has recently been rather high. A Hornsby water-tube boiler is under erection to supply steam specially for the generators.

DRAINAGE.—This has to be raised by the Shone system (compressed air). The ejector chamber is at the Bexhill end of the site.

WATER SUPPLY.—Surface water is used with a supply from Bexhill for special and make-up purposes. Quenching water from the retort-house is run back into settling-tanks, and used over again as much as possible. There is a well near the Shone chamber, some 30 ft. deep. But this only takes top water; since, if sinking is carried through the sandrock, salt water percolates, which, without treatment, would be unsuitable for boiler purposes. A cast-iron tank is at present used for storing surface water; but this is provided in case of contingency with tar and liquor. At the present time, the tar and concentrated liquor are despatched as produced to the chemical works. In connection with this storage tank, special pumps are already provided in a small building near the power house.

SUNDRY PLANT.—On the siding is a coke-breaker, electrically driven, which can be used in connection with a steam-crane and grab. In the yard there is a reserve coke-breaker, with gas motive power arranged to load trucks direct [not recently used]. There is also a washing and screening plant to deal with retort-house ashes; but it has not fulfilled anticipations.

WORKSHOPS—comprising smiths, mechanics, carpenters, masons, and painters—are ranged alongside the Hastings Road.

OFFICES.—These, at the entrance to the works, have ample accommodation, and are combined with the stores, stables, and workmen's lobby.

The works were mainly constructed, by the direct employment of labour, under the supervision of the designer (Mr. Chas. F. Botley), and represent a pre-war value, excluding the trunk main, of £125,000.

Fuller details will be found in the "JOURNAL" for May and June, 1903.

A LUNCHEON AND SOME SPEECHES.

Having explored the works but not exhausted the interest, the time had arrived when the visitors were due to leave for the Queen's Hotel, where the Chairman and Directors of the Company were entertaining them at lunch. Appetites had been sharpened by the journey and the couple of hours spent at Glyne Gap; and when the luncheon room was reached, the grace uttered by Canon Cook was heartily endorsed in more ways than one. Dr. Gray was in the chair. To his right-hand was the Mayor, Mr. W. Perrins; and at his left-hand side was the President. Among the guests were: Mr. J. N. Collins (Deputy-Mayor), Mr. Percy Idle, Mr. P. H. Palmer, Mr. R. F. Ferguson (Borough Electrical Engineer), Mr. W. V. Edwards (Engineer and General Manager of the Hastings Tramways Company), Mr. G. R. Butterworth, Mr. T. H. Martin, Mr. Alfred Blackman, Mr. W. T. Dunn (Secretary of the Institution of Gas Engineers), Mr. S. B. Chandler (President, London and Southern District Jun. Association), Mr. Caleb Diplock (Deputy Chairman of the Eastbourne Gas Company), Mr. J. S. Garrard (Secretary of the Eastbourne Company), Mr. R. H. Kersey (Director of the Bexhill Gas Company), and Mr. W. M. Jesty (Secretary of the Bexhill Company).

After luncheon, the loyal toast was honoured, and the Chairman announced that a number of messages of regret for non-attendance had been received; among them being one from Sir Dugald Clerk, the President of the Institution of Gas Engineers, and one from Mr. D. Milne Watson, the President of the National Gas Council.

Mr. H. C. HEAD (Winchester) proposed the toast of "The Borough of Hastings: Prosperity to Town and Trade." He pointed out how immensely the town had progressed during the thirty years he had known it. Hastings had an enlightened Corporation, who, among other things, had acquired the electricity undertaking. Whether or not they were wise to do this was a matter of opinion. But it showed the progressive idea, and the progressive idea was the beginning of all municipal departments. While all public utility services tended to the public welfare in a district, a certain amount of rivalry was not altogether amiss. But because they were up-against their friends in business, it did not mean that they were up-against them in general policy, and in good wishes for the welfare of the public they both served. [Hear, hear.]

The MAYOR, in his reply, gave a hearty welcome to the visitors, and expressed the hope that the visit would be both enjoyable and advantageous to them. He was sure that the members would appreciate the difficulties under which the authorities in towns like Hastings had to labour. Sometimes they had to come into conflict with the gas company when they thought they were charging the public a great deal more for gas than it was believed they ought to do; and they then flew to the electricity undertaking, and found it more expensive still. [Laughter.] However, the authorities did desire to act fairly and prudently with the Gas Company. He believed that sunshine and prosperity were again about to shine on the town.

The TOWN CLERK also acknowledged the toast on behalf of the Corporation officials.

Mr. W. DOIG GIBB proposed the toast of "The Hastings and St. Leonards Gas Company." He was sure those present would welcome the toast if only for the reason that the Chairman and Directors were their hosts that day; and it was due to them that they were sitting round a hospitable board, and were to enjoy a drive round the district during the afternoon. The Directors were to be congratulated upon both their works and their management. [Hear, hear.] The

visitors had gone through the works with great interest that day, and they had seen quite a lot that educated everyone of them in every direction. They were satisfied from their inspection that the Botley tradition had descended to the son. The Glyne Gap works would be a credit to any gas company in Great Britain. While wishing the Company all prosperity, they took the opportunity of cordially conveying to the Chairman and Directors the thanks of those present for the profitable and pleasurable day they had given to them. "May we be more closely knit in friendship's ties each passing year."

The Chairman said before replying to the toast which had been so kindly proposed and received, he wished to extend to all a very hearty welcome, and to express the happiness he and his colleagues felt in having them with them that day, and the hope that the visit would be as pleasurable to the visitors as it had been to himself and his colleagues. They had done the Company the honour of selecting their President from among them; they had further honoured the Company by paying a visit to the town and their works. Regarding the works, he ventured to say that in them, the visitors had found an excellent and enduring testimony to the high ability and valuable services of their President, who designed the works, and in conjunction with his esteemed father carried them out, and had since managed and extended them. The works spoke louder and more forcibly than words; and they would have made known the reasons for valuing the Engineer and Manager and his untiring service. For thirty-four years he (Dr. Gray) had been connected with the Company as a Director and somewhat longer as a stockholder. For twenty-four of these years, he had had the honour of presiding as Chairman. He divided his life into two periods—that which had preceded the war, and that which had followed. In the same way, the life of the Company divided itself into two periods. Regarding the first period, service as a Director was a pleasure. They had times of difficulty it was true; but, as a rule, service was a pleasure—they had contented workers, a fair price, and a moderate rate of dividend, which increased as the price was reduced. All this and more the war had directly or indirectly altered. Now the dividend was only 2½ guineas per cent.; and the capital had depreciated by about one-half. The price of gas had gone up nearly double, and that which was a pleasure had become a constant anxiety and worry. He said "directly or indirectly;" for the Government and especially departmental Government had done more harm than the war could directly have done had things been left alone; for some matters had been subjected to the interference of officials who apparently regarded themselves as heaven-born administrators and geniuses—able to manage anything without training or experience. Under their interference, fuel, freightage, labour, gas—in fact, everything had gone up; and (what was almost as bad) it had been impossible to tell from one half year to another what the cost or supply of anything would be. Thus while companies in other lines of business had made a profit—some of them they were told had actually profiteered—gas companies alone had found their dividends diminishing, and threatening to disappear, owing to restrictions imposed and perhaps essential for times of peace which had been allowed to survive and to be misapplied during times of war. The Government had at last seen the injustice of the position, and the necessity for something being done, as the Public Utility Companies (Capital Issues) Bill, and the promised Gas Regulation Bill showed. Such measures were absolutely necessary if the gas industry was to be restored to its former prosperity and usefulness. In drinking to the health of the Company, they had drunk to that which was necessary for that health—the success of these measures. [Applause.]

The President (called upon by the Chairman) said this was an occasion in a man's life that was—and, if he had any pleasure in his associations and work, it was bound to be—a proud day. He need scarcely say how greatly indebted he was to those gentlemen—citizens of the town—who came to support him that day, to the members who had spared no effort to support him, and to his Chairman and Directors whose courtesy and kindness had enabled these things to be done that day without difficulty. It said something for a board of directors when he knew that, ever since the time he took full charge owing to the untimely death of his father, matters had been going against them; and it said something for the Board that, despite all this, they had not lost confidence in the management, but had recognized as honourable and straightforward men that the difficulties which had had to be met were beyond his control. [Applause.] He also referred to the silly misleading muddles that some papers were making as to the intentions of the Gas Regulation Bill; and he asked all present to do their best to correct wrong impressions. Gas companies expected, and had a right to expect, fairness in these days.

Visit by Road to Winchelsea and Rye.

Again by the generosity of the Directors of the Company, the visitors were taken by the motor conveyances for a drive through some of the beautiful country surrounding Hastings. The drive extended through Winchelsea and Rye; and at the latter place, descent was made from the vehicles to allow an exploration to be made of some of its historic interest.

On returning to Hastings, the conveyances put the party down at the pier, in the tea room upon which the President and Mrs. Botley kindly entertained them at tea. Afterwards, Mr. W. E. Price, in the name of the visitors, thanked the President and Mrs. and Miss Botley for all their kindness during the day, and especially for the tea; and there was no mistaking the unanimity with which endorsement was given. The members made the President say a few parting words. And then Mrs. and Miss Botley were called up; and they responded to the call. Everybody was happy, and in this spirit was added another day to the good record of annual outings of the Southern Association.

In the twenty-four hours of Dec. 18 last, New York City consumed no less a quantity of gas than 160,327,000 c.ft.

Members of the Midland Section of the Coke-Oven Managers' Association will on June 5 visit the Retford works of the Northern Rubber Company, Ltd.

THE MIDLAND ASSOCIATION AT BANBURY.

After a somewhat long break, rendered unavoidable by the trying times through which the country has passed, the Midland Association of Gas Engineers and Managers last Tuesday resumed their spring meetings—the outing taking the form of a visit to Banbury, which is the town of their President, Mr. James R. Duff. A better choice could hardly have been made of a place for what it is to be hoped may prove to be the first of a fresh long series of these combined business and pleasure meetings. Mr. Duff had some useful "wrinkles" to impart; but it is no disparagement of them to say that it is the "pleasure" side of the day's proceedings which will probably remain longest in the minds of those who were present.

It was not the first visit of the Association to Banbury; for they were there in 1896, in which year Mr. W. R. Cooper (then Manager of the Gas Company) was President. Many things have happened since then. In fact, it may almost be said that the world has changed. But Banbury has not—at least, not greatly. It remains the same dear old town, with its wealth of historical associations; it is still fortunate enough to number Mr. Cooper among its residents; and the Directors of its Gas Company have lost none of the hospitable spirit by which the earlier visit of the Midland Association was marked. All that there is to be known about Banbury and its neighbourhood cannot be learned in one day; but Mr. Cooper, with his co-Directors of the Gas Company, did not spare themselves in their efforts to impart to the visitors as much as possible of their own store of local knowledge.

Members arrived from different places at various times; and those who were among the earliest to reach the town began their day as the guests of the Banbury Gas Company with a morning drive to places of interest. They were taken through the area of supply, while features of interest were pointed out by Mr. Cooper. They saw the famous Reindeer Inn, which is associated with the times of Royalist and Parliamentarian, the Bishop's Palace, and the fine old Parish Church. But before this they, as well as the later arrivals, enjoyed a hearty welcome from the President in his house adjoining the gas-works—opportunity for inspecting which was afforded during the day.

In his Presidential Address to the Midland Association last March, Mr. Duff dealt at length with the history of the Banbury Gas Light and Coke Company, with whom he has been since 1907. He told the members then that the works were erected on the present site over sixty years ago; and that since he took charge the increase in consumption has been rapid—the works having been remodelled and improved to meet the growth in demand. The features of the plant were explained to the visitors by Mr. Duff, and his assistants, Mr. W. R. Day and Mr. W. J. Imbrie.

There are sidings into the works, which are situated between the London and North-Western Railway and the Great Western Railway. The rails pass through the retort-house; the trucks being hauled from the main lines by means of a steam winch. Coal is emptied direct into the breaker-pit at one end of the retort-house, and elevated into the hopper carried on the Fiddes-Aldridge charging and discharging machine. There are seven through beds of eight retorts, 16 in. by 22 in., and 20 ft. long, fitted with Cort's anti-dip pipes and valves, and a Braddock retort-house governor. Eight-hour charges of 8½ cwt. are worked; and the coke is run out in tip-barrows, which take a full charge from the retort. The two new Bryan Donkin exhausters are of 15,000 and 30,000 c.ft. an hour capacity; and under the same roof is the boosting plant, by means of which gas is sent a distance of some six miles from the works, for the United District Gas Company (who are supplied with gas in bulk into their holder at Adderbury), and also for the supply of three villages. During the evening the gas is distributed at about 70 in. pressure; and there are Reynold governors on the main, by which it is reduced to 4 in. at each village. The electric generating plant consists of a gas-engine direct coupled to a dynamo. There is no duplicate set; but a spare armature is carried for the dynamo, and a spare motor for the charging machine. Mr. Duff alluded to the fact that, in the course of the reconstruction work, the old corrugated inside of a Kirkham, Hulett, and Chandler washer was taken out, and Holmes's brushes put in.

The purifiers are of the overhead type; the oxide for charging being raised in buckets by a reversible steam-engine. These hold about 15 cwt., and are carried on a travelling runway over the boxes. A very interesting feature of the Banbury works is the Humphreys and Glasgow water-gas plant, which was put down during the war to serve a special purpose. It is of a capacity of 200,000 c.ft. per day, and has been used for the manufacture of blue gas. The special feature about it is that all the control can be operated from the ground floor, which is found a great advantage, as adapting it for small works. It is much cooler for the operator, whose procedure it is easy to watch; and the control is so arranged that even a semi-skilled person is not likely to get confused. As a matter of fact, during war-time the plant was operated by a young woman, who was able to sit by in comfort when not actively engaged in her work. A man, of course, was required for clinkering the generator and raising the coke to the charging floor. The coke was taken up in bags, with which the woman was able to charge the generator as needed.

A point about the sulphate plant (which was seen to be turning out an excellent product) is the small space it occupies. It is by Messrs. C. & W. Walker, and is of a capacity of 1 ton per day.

This suggestion of compactness, however, is not peculiar to the sulphate plant; it is to be met with everywhere on the works.

At the Red Lion (an old hostelry with which, by the way, everyone was enchanted), a party of about sixty sat down to lunch—their hosts, the Gas Company, being represented by Messrs. T. E. D. Garrett (Chairman), W. R. Cooper, T. O. Hankinson, W. J. Harding, and Arthur Fairfax (Directors). With them sat the President and the Vice-President (Mr. James Paterson), and Mr. W. H. Bennett (the Hon. Secretary of the Southern Association of Gas Engineers and Managers). Before leaving the tables, the President expressed, in a few well-chosen words, the thanks of himself and all the other members present to the Chairman and Directors of the Banbury Gas Company for the hospitable manner in which they were entertaining them. In his capacity as Engineer, he could not speak too highly of the way in which they treated him. One thing he much regretted was the absence through severe illness of their old friend and immediate Past-President, Mr. A. T. Harris. He was sure they would like the Hon. Secretary to write and tell Mr. Harris how the members sympathized with him in his trouble. The vote of thanks was seconded by Mr. J. Paterson, who spoke of the generous hospitality which had been extended by the Directors of the Gas Company to the Association, and assured them it was thoroughly appreciated by the members. The Chairman, in the course of his response, declared that the Board had never failed to carry out anything which their Engineer, Mr. Duff, had suggested; and all the suggestions that he had made had turned out excellently well. They had never been deceived by him. The times were, of course, very difficult. When the price of coal went up, they could not raise the price of gas, because they had reached their maximum; but when the price of coal went down, they were obliged to make an abatement. Still, he believed there was a big future for the gas industry. It was a great pleasure to them all to have with them that day the senior member of the Association—Mr. W. R. Cooper. Mr. Vincent Hughes, who proposed the health of the President, said he thought there were not more than three or four members of the Association present that day who had the pleasure of visiting Banbury when Mr. Cooper was the President in 1896. He (Mr. Hughes) must plead guilty to being one of them.

The afternoon was devoted to a motor drive to the top of Sun Rising Hill and then to the scene of the battle of Edgehill—a fierce conflict which took place between the forces of King Charles I. and Cromwell—with results greatly to the advantage of the latter. The glorious views were much admired. A return was made to the Red Lion for tea; and then many of the visitors proceeded to the Banbury Bowling Club, who have a noted green. All left in the evening with a very favourable impression both of the locality and of the Gas Company.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Annual General Meeting.

The Annual General Business Meeting of the Association which was attended by about seventy members, was held on Friday, the 14th inst., at the Westminster Technical Institute—Mr. S. B. CHANDLER (the President) in the chair.

REPORT OF THE PRESIDENT.

The session now closing has been marked by a revived and exceptional increase in interest, membership, and good attendance at meetings and visits. The London Association has now a membership of 272, 115 having joined since the commencement of the session. This is very encouraging, and makes even firmer the position the Association occupies in the gas industry. The Association is now an important feature, and is looked upon by the senior members of the profession as a useful and necessary technical body. We are encouraged very much in our efforts to maintain a high standard by the interest with which we are so regarded; and the advice and help of the seniors—at all times welcome, and of great benefit—has, to my personal knowledge, resulted in an influx of new members, many of whom are at the commencement of their careers.

Membership of the Association affords a good opportunity for furthering education, both in engineering and distribution; and the preparation, presentation, and discussion of papers offers scope for this. The gas industry is faced with many problems—the future policy is not yet clear; many changes in administration, manufacture, and sale of gas are imminent; and, generally, all matters which go to make up what is known as the gas industry must be subjected to future deliberation and discussion. It is becoming more and more important that all who wish to obtain for themselves administrative positions, many of which will be available, should turn their thoughts towards these problems, realizing that the "wait and see" period has long since passed, and that new ideas, methods, and application are required to carry matters through to a successful issue.

The programme of the session has been of exceptional interest; and the Association has reason to congratulate itself upon the high technical standard of the various contributions placed before the members.

Educational matters have engaged the attention of the Junior Gas Associations for some long time. It will doubtless be recollected—at least by the older members—how some time ago the Junior Associations were asked by the Institution of Gas Engineers to form a Committee to discuss certain aspects of education as applied to the gas industry, and the formation of a scheme of tuition based upon modern requirements. This Committee was duly formed, comprising a representative of each of the Junior Associations, appointed by them, with Mr. Clark as Hon. Secretary. The Committee subsequently met the Education Sub-Committee of the Institution on one or two occasions; and, as a result, the Institution asked for a scheme to be formulated and presented by us through Mr. Clark, who is acting as our representative on the Institution's Sub-Committee. This was done, and matters are progressing satisfactorily, so much so that it is hoped that very shortly a scheme will be approved and put into operation which will benefit the industry generally and bring up to date the examinations in engineering and distribution.

The Junior Associations are in this way helping in the education of the young engineer; and the co-operation which now exists with the senior body is proof of the appreciation with which the Junior Associations are regarded. It is a healthy sign, and a forerunner of future usefulness.

The formation of the National Association of Technical Gas Officials has led to inquiries as to the aims of the new body. As already explained to you, all the Junior Associations have appointed representatives to attend meetings of the Association with a view to some sort of co-operation with them. In our own case, our new President, Mr. Pearce, has been appointed to represent us; and he will no doubt in due course be able to report to you fully as to the aims, objects, and constitution of the Association. It will then be for you to decide as to what action you may take, either collectively or individually, in associating yourselves with the body. Possibly you may care to raise the matter later on this evening, with a view to discussion. Accordingly, at the conclusion of my remarks, opportunity will be given for this to be done. I would like to say, however—and this is a personal view—that if the new Association has as its basis more complete co-operation between employer and employed (which is already existent among all co-partnership companies in the South), is not a trade union, and does not look with approval upon methods which in their operation produce industrial disturbance, then it would appear that if by our connection we are able to assist in ameliorating conditions existing possibly in other parts of the country, to the benefit of the technical gas official, we should lend our aid and support the Association for the benefit of our own industry.

THE RETIRING PRESIDENT THANKED.

Mr. J. G. CLARK referred to the indebtedness of the Association to Mr. Chandler for his work during the past five years, and moved that the following resolution be emblazoned and framed and presented to the retiring President:

That this Annual General Meeting of the London and Southern District Junior Gas Association sincerely acknowledges, and hereby places upon record, its keen appreciation of Mr. Samuel B. Chandler's excellent services in conducting and promoting the ideals of the Association as President during the sessions 1915-16 to 1919-20. The business qualities and untiring enthusiasm he displayed have very considerably enhanced the position held by the Association in the industry, particularly during the difficult period of the late war, and the reconstruction year since its termination; and upon his relinquishing office the members wish him great success in his future career, and tender to him their sincere thanks.

This was seconded by Mr. L. E. WELLARD, and heartily agreed to.

The PRESIDENT said the honour done him amply repaid any work (which had never been a labour) that he had put in.

The Council were thanked, on the proposition of Mr. D. J. WINSLOW, seconded by Mr. C. J. LOVE.

NEW OFFICERS.

The following office-bearers were elected:

President.—Mr. Frank J. Pearce, North Middlesex Gas Company.

Senior Vice President.—Mr. F. A. Frost, South Metropolitan Gas Company.

Junior Vice-President.—Mr. D. C. Cross, Lea Bridge District Gas Company.

Hon. Secretary.—Mr. George Winslow, Gas Light and Coke Company.

Hon. Treasurer.—Mr. A. Broadbent, Gas Light and Coke Company.

Council for 1920-21.—Mr. W. E. Brown, Mr. T. J. Beardmore, Mr. W. N. Booth, Mr. W. Grogono, Mr. E. G. Stewart, Mr. L. E. Wellard, Mr. W. L. Westbrook, Mr. F. E. Woodfine.

SUBSCRIPTION INCREASED.

After some discussion, it was agreed to alter Rule 6 to read:

The members' subscription shall be 12s. 6d. per annum, which wil include for every member a copy of the "English Junior Gas Association's Joint Proceedings."

An amendment to add the words: "Provided the Hon. Secretary be notified that the member wants a copy," failed to find a seconder; but it was agreed that any member would be allowed to pay his subscription by instalments.

GAS-HEATED CRUCIBLES AND OVEN FURNACES.

Mr. Arthur Forshaw, M.Sc., read a paper on "Gas-Heated Crucible and Oven Furnaces" at a meeting last Thursday week of the Birmingham Metallurgical Society. Mr. F. C. H. Lantsberry, F.I.C., presided over a large attendance.

The first part of the paper was devoted to a classification of coal-gas furnaces; and then the author went on to deal with modern developments. He said he had been informed that some high-pressure gas-furnaces have been in use in Birmingham for four to six years without re-lining. As to crucibles, provided the pot survives the first heat, its life will mostly depend on the correct setting of the gas and air to one another; and as the correct setting for economical melting coincides with that for the longest life of the pot, this is a point to which attention must be given. There must not be an excess of air; otherwise, apart from oxidation of metal, the graphite in the pot substance will be burnt-out, and the pot become rapidly useless. The same result may be produced locally by a burner that allows the jet of air to impinge on the pot before it is properly mixed with the gas; and this is one excellent reason in favour of an air-jet so placed inside the body of the burner that a good mixture of the gas and air is already occasioned before the two issue from the orifice. There are two other possible causes of excess of air in the furnace. One is partial stoppage of the burner-orifice by slag, in which case the back-pressure caused reduces the amount of gas injected by the air; the other is fluctuation of gas-pressure in the supply-pipe. The latter can be cured by using a gas-governor.

A most important point in gas-heated crucible practice is increased output as compared with coke-heated furnaces. As an illustration, take the case of a 60-lb. furnace melting brass for medium sand castings. It is considered good work to pour eight or nine melts per furnace per eight-hour shift with coke. He has seen this done; while, when working under the same conditions with gas, thirteen or fourteen melts were obtained. In general, one may anticipate an increased output of at least 50 p.ct. This increase of output is not perhaps primarily due to any desire for such a result (very welcome though it may be), but is mainly the secondary outcome of the urgent necessity for reducing the quantity of the expensive fuel, coal gas. Naturally, as the gas crucible furnace owed a good deal to the coke furnace, which it had been designed to supersede, it followed the general lines of the latter; and these did not include any specific arrangement for utilizing the waste heat of combustion in preheating the metal. As gas furnaces began to be more widely used, it was recognized that some utilization of waste heat must be introduced on the grounds of fuel economy; and this idea found its fulfilment in the introduction of preheating. At the same time, the virtue of increasing the rate of gas consumption with the same end in view was recognized. In addition to preheating the metal, efforts have been made to preheat also the gas and air, or both. Unless this is done thoroughly, and a fairly high temperature attained in the preheating, the theoretical advantage is not great in so far as the amount of heat actually returned to the furnace is concerned. A further advantage, however, claimed for the arrangement is in the fact that, by burning together air and gas, which are already at a high temperature, a much hotter flame is produced. As the heat transference from the combustion space through the crucible to the metal depends, *ceteris paribus*, on the difference of temperature between the two sides of the crucible wall, this contention appears to have some justification.

With regard to metal losses, there is not a large amount of evidence as to the saving in this respect due to using gas-heated crucibles; but in general it appears that the losses are about 2 p.ct., as against 5 p.ct. for coke. It is evident that, apart from the irrecoverable losses with which these figures deal—which refer usually to loss of spelter and oxidation—spilt metal (due to burst pots), or any other cause, is much easier to reclaim from a gas furnace than from a coke-furnace where the combustion space is filled with coke and ashes. To quote only one figure, Hocking gives the total material to be ground and extracted per 100 tons of metal melted at the Mint, where recovery must be as complete as possible, as follows:

	Gold.	Silver.
With coke	4·3 ..	3·0 tons.
With gas	1·3 ..	0·5 ,,

Next Mr. Forshaw referred to oven furnaces; remarking that a further development of gas-oven furnaces particularly suitable for continuous working, and designed with a view to extreme fuel economy, has lately been effected. This takes the form, already well known in large producer-gas and coke-fired furnaces, of really efficient "recuperators" or "regenerators." Such furnaces entail a higher first cost, and require to be permanently built in the place where they will be used. The recuperator consists of a series of fire-brick channels through which the products of combustion make their way to the chimney flue; while the air for the combustion of the gas makes its way in the opposite direction along channels separated from the products' channels by the thinnest permissible fire-brick partition. At the outer end of the recuperator, the coldest air is alongside products which have already given up most of their heat. As the air moves steadily forward through the recuperator, it is subjected to ever-increasingly hotter brickwork, until it enters the furnace proper. In this way—*i.e.*, "counter current"—the best interchange of heat between the products and air is effected by recuperation. The regenerator (first described by Siemens in 1856) consists, on the other hand, of two chambers filled by fire-brick chequer-work. At the start the cold air is directed up through one, and the hot products of combustion down through the other, in which they give up a large proportion of their sensible heat to the chequer-work. After a suitable interval, the direction of the air and products is reversed. The air now travels up through the hot chamber, and the products down through the cold one. The air thereby picks up the heat previously imparted to the chequer-work by the products, and returns it to the furnace; while the products heat-up the cold chamber against the next reversal of direction. The reversal of the air and products in the regenerative type is usually done automatically, and so, once set, is independent of the human factor.

By means of either one of these methods, it is claimed that a temperature of over 1600° C. can be attained, and a saving of at least 50 p.ct. in the gas consumption necessary for any given operation made possible. It must be pointed out, however, that if recuperation or regeneration is to be really effective, the furnaces require a considerable time before a steady state of temperature is arrived at, and that therefore they are hardly suitable for furnaces which are only used intermittently. Both systems require air to be under slight pressure from a fan, or else depend for their air on the pull of a chimney-shaft. The former is preferable, as chimney draughts vary from day to day with the weather conditions.

It is difficult to find actual results illustrating the working of the furnaces enumerated in the lecture. Such as there are vary among themselves on account of the difference of treatment practised by different works. He gave the following figures as actual results from works practice:

Operation.	Load.	Duration.	C.Ft. Ton. Cal. Value Unknown.	Temperature.	Length of Furnace
Annealing H.S. steel	3½ tons	8 hours	3000	850	16 ft.
Ditto	3½ tons	15½ hours	6000	754	16 ft.
Annealing C.I. parts packed in fillings	2000 lbs.	3 hours	3360	Not given	6 ft.
Annealing C.I. sewing machine parts	8725 lbs. in 1454-lb. lots	6 hours each lot approx.	4200	,,	4½ ft.
Large marine engine parts heated for forgings	18·675 tons gross, about 1000 lbs. each heat		*3320 on gross wt. *9970 on net wt.	,,	Not given
	11·1 tons gross, about 231 lbs. each heat		*2440 on gross wt. *9061 on net wt.		,,

* The difference between gross and net is accounted for by the number of times each forging was reheated. This varied from three to six, according to its size and intricacy.

REFRACTORY MATERIALS MEETING.

The Refractory Materials Section of the Ceramic Society held their seventh meeting at the Central School of Science and Technology, Stoke-on-Trent, on April 28 and 29—Sir William J. Jones presiding. There was a full programme of papers, &c.

On the first morning, Sir W. J. Jones explained and exhibited a high-pressure oil-burner from a glass works, for which a 50 p.ct. mixture of creosote and pitch was used, as the cheapest available oil. The oil in a storage tank 10 ft. above the burner was kept at a temperature of about 100° Fahr. by means of low-pressure steam, and was introduced by a drip-feeder. The oil was atomized in the burner; air being sucked in at the same time. One burner was sufficient to heat a furnace 14 ft. by 8 ft. by 4 ft. (or more) deep, containing eight glass pots. The heating was very uniform and efficient—the plaining temperature being 1500° C. Unfortunately, the exceptionally high price of all liquid fuels at present is against it. In the afternoon, Mr. W. C. Hancock, B.A., commenced with a paper entitled "Notes on the Influence of Grog in Admixture with Clay." This had reference to the amount of tempering water found necessary with varying proportions of grog, and the corresponding drying and firing shrinkages. It was clearly shown that the amount of tempering water decreases as the percentage of grog of a particular grade increases; but the amount of water increases with finer grained grog. In one set of experiments, the amount of water seemed to diminish as the proportion of the same grade of grog (coarse, medium, or fine) increased. The author ascribed this difference to the fact that the material from which the test-pieces showing the larger amounts of water were made, was much better pugged and was stored longer before moulding.

Mr. W. J. Rees followed with a paper on A.—"Corrosion of Coke-Oven Walls." B.—"Action of Salt on Silica and Fire-Clay Bricks." This was a report on an investigation suggested by Mr. H. V. Thompson's paper read at Sheffield last year. Some bricks were soaked in a saturated solution of salt, dried-out, and coked at 950° to 1000° C. The order of resistance to salt attack

was found to be as follows: Silica bricks with lime bond, silica bricks with clay bond, semi-silica bricks (made from clay and ganister, and containing 80 to 90 p.ct. of silica), and ordinary fire-clay bricks—the last being attacked the most. The bleaching action of salt vapour on bricks is fairly complete. In a sample brick shown, the iron oxide had been reduced by the action of salt vapour from 3 p.ct. to about 0·5 p.ct. There is apparently no simple relation between removal of the iron and absorption of the alkali. Absorption varies practically in the order of failure with slagging action. Mr. Rees fully confirmed Mr. Thompson's observation as to the formation of crystals of hæmatite on the cool-end of a brick shown to the members. Fire-clay bricks with a large proportion of sillimanite were much more resistant to salt attack than ordinary fire-clay bricks. Sillimanite and tridymite are much less soluble in alkaline flux than quartz or half-fired clay. The most promising line of development seems to be properly-made silica bricks, though there are possibilities in connection with an aluminous brick (containing sillimanite).

"Fused Artificial Sillimanite" was the title of a paper by Mr. A. Malinovszky. The interest of this depends on the fact that sillimanite is a refractory possessing some desirable properties, and the artificial product may be used for special purposes when the cost is not prohibitive. It is prepared by smelting in a special cupola furnace crushed aluminous rocks or minerals mixed with a suitable reducing agent (coke or other carbonaceous material). Aluminium carbide and silicon carbide are formed; and subsequently by oxidation these give rise to sillimanite and silica, the latter being more or less completely volatilized. The fused sillimanite so obtained is highly refractory, and free from expansion and contraction at any temperature.

The second day commenced with a general meeting, at which it was stated that the contemplated visit to the United States had been abandoned; but the invitation of the American Ceramic Society remains open until a more favourable opportunity occurs. The autumn meeting will be held in London, and the following spring meeting at Bournemouth.

A Symposium on Gas-Firing.

A "Symposium on Gas-Firing" followed, opened by Dr. E. W. SMITH, of Birmingham. Dr. Smith briefly reviewed the possible sources of gas, including town gas, which he said is only used for small furnaces or small works, and not where blue water gas or producer gas is available. The main advantage of town gas is that it is obtainable from an outside source, and so permits a considerable saving in space. A constant flow of heat units is required; and the factors which control this are constancy of calorific value, constancy of pressure, and especially constancy of specific gravity. Absolute constancy of conditions is not always necessary in large operations. But the very high cost of producing heat units is against town gas. The adoption of vertical retorts reduces the cost of gas, even after allowing for the lower calorific value. But there is the necessity of not giving way to the temptation to increase the production of gas per ton at the expense of the calorific value. Inerts are not of importance, if constant, even if high. But washing, &c., would increase expense. On a B.Th.U. basis, the relative cost of producer gas, coal gas, and blue water gas is as 3 : 4 : 5 respectively. Thus producer gas is much the cheapest on this basis; and almost any combustible can be used with it, if of reasonably constant quality, and if the conditions necessary be studied.

Mr. H. M. RIDGE referred to a case in which a plant formerly used 150 tons of coal; the waste gases reaching the chimney at 800° C. By utilizing some of the waste heat—that is, by discharging the waste gases at 270° C.—and without lessening the work done, the coal was reduced to less than 80 tons.

Mr. E. M. MYERS stated that gaseous firing can supplant any coal-firing process, with resulting economy in fuel which is sometimes as high as 50 p.ct. High working temperatures can be obtained with gas; and a furnace or kiln so fired has a longer life, because of more regular temperature conditions. Coke-oven gas is quite equal to town gas in calorific value, and will be the town gas of the future. During a recent visit to the United States, he found that in one instance it was being supplied as far as 150 miles from the source. The chief difficulty with coke-oven gas is its lightness and consequent tendency to rise. There must be accurate control of both the pressure and the quantity of gas and air at the inlets, and also of the outlet pressure of the products of combustion.

Col. C. W. THOMAS pointed out that the economy really arose in recuperation or regeneration, not in gas-firing; for a direct-fired continuous kiln compared favourably with a gas-fired kiln. Recuperative firing was bound to come, but not necessarily gas firing, except where the latter effected economy in labour, lower cost of repairs, and better lay-out of the plant.

Mr. RICHMOND gave an experience of burning fireclay material in a gas-fired kiln erected in 1914, and having been in regular commission since that date.

It was decided that the discussion should be continued at the next meeting of the Society.

A communication was read from Dr. A. Granger, on the "Development of the Tunnel Oven;" but further discussion was postponed.

The paper by Mr. W. Emery on the "Casting of Gas-Retorts" is unfortunately not available for publication for a few weeks.

RESEARCHES ON COAL.

At the Cardiff meeting in March of the Bristol and South Wales Section of the Society of Chemical Industry, a paper was read by Mr. S. Roy Illingworth, B.Sc., F.I.C., A.R.C.S., entitled "Researches on Coal." He dealt with the results of an investigation planned to elucidate the relative stability of certain known components of coal when subjected to carbonization under standard conditions. The relative behaviour of certain coals when carbonized at various temperatures up to 450° C. was studied. The coals chosen were coals which, when carbonized at 950° C., yield cokes of different types. The samples used were "mine" samples, cut from roof to floor of the seam; and they comprised about 80 to 100 lbs. of coal, from which a 14-lb. laboratory sample was obtained by the usual process of quartering down the bulk. This smaller sample furnished the coal actually used in the investigation. The results arrived at, along with the tables and various diagrams, occupy about eight pages of the May 15 issue of the Society's "Journal."

The main results of the investigation are that the decomposition of the coals at temperatures up to 450° C. results in the destruction of the pyridine-soluble constituents of the coal substance. The decomposition of the pyridine-soluble constituents results in a more rapid decomposition of the β-cellulosic substances than of the resinic compounds. In all probability the β-cellulosic constituents are the first to decompose. Two types of β-cellulosic and resinic compounds occur in each of the coals examined. One type is readily decomposed at 450° C.; the other type is comparatively stable at this temperature. The typical coking coals contain an approximately homogeneous β-cellulosic class of substance readily decomposed at 450° C., while the other coals examined contain nearly equal amounts of the two types just enumerated. These facts are generally characteristic of the resinic substances in these coals, though the homogeneity of the resins is not so well marked in the true coking coals. The progressive decomposition of the β-cellulosic and resinic substances in the case of the coking coals results in a rapid increase of the ratio of resinic to β-cellulosic constituents. In the other coals the increase of this ratio is very gradual. Progressive decomposition of the coal substance at temperatures not exceeding 450° C. will ultimately result in a residue devoid of β-cellulosic substance, but one which still contains resinic substances. Nitrogenous compounds in the coal are destroyed. At 450° C. the nitrogen eliminated represents approximately 10 p.ct. of the total nitrogen present in the coal. Sulphur compounds are more readily decomposed in the highly bituminous than in the less bituminous coals.

Dimensions of the American Gas Industry.

Addressing the members of the Pennsylvania Gas Association, Mr. C. E. Bartlett, of Philadelphia, said that 1100 artificial gas companies in the United States and Canada have a combined capital of $4,000,000,000; while there are approximately 500 concerns engaged in the manufacture of appliances using and making this gas. There are to-day nearly 50 million people in gas-served territory; and 8½ million consumers use 327,000 million c.ft. of gas per annum. But great as these figures are, they are small compared with the possibilities. Of 8½ million consumers. a reasonable estimate is that 6½ millions are domestic consumers. Allowing five persons to a family, this leaves 3½ million families not now on gas-mains, although living in gas-served territories. From 1913 to 1914 the increase in the number of meters connected was 468,000. From 1913 to 1919, therefore. should have shown a total increase of 2,808,000 meters, instead of which the actual figure is 1,688,000; so that there now exists a shortage of 1,120,000 new consumers. Promising, however, as the new consumers' field appears, there can be little doubt that the big "unsold" market lies in the present 6½ million families of domestic consumers who are for the most part undersold on equipment, or only part-time users of gas, or both. Both coal and oil have advanced to points undreamed of in the past; while in comparison the advance in the price of gas has been negligible. Nor is it likely that any recession is to be looked for in the cost of competitive fuels. Gas is to-day for many uses the cheapest fuel. The public do not want advice and fatherly care. They want comforts, conveniences, and pleasures, and are willing to pay for them.

The Expansion of Town Gas.—The "Technical Review" says that some notes by Signor Canovetti in "L'Industria del Gas" refer to observations made and tests taken on two holders at the Catania Gas-Works. One of these holders is enclosed within masonry for about two-thirds of its circumference; the other, having a capacity of 3400 to 3500 cb.m., is of modern construction, with cast-iron columns, but surrounded by walls of buildings some distance away. The great difference in the level of the holder-top noticed during the day and night first of all led to the observations being made. Tables are given showing the relative quantities delivered during the day and night hours, but at two different periods of time in each case. The results of these observations seemed to point to thefts of gas during the night-time, so great was the difference in consumption. As, however, doubt on this score was cleared-up, the difference could only be attributed to expansion. Thermometrical measurements were then made; and the expansion of the gas contained in the holders was found to be very marked during the hot hours of the day.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Coal (Pit's Mouth) Prices Order and Direction, 1919.

Sir,—The increases of 14s 2d. and 4s. 2d. in the prices of coal used for domestic and industrial purposes respectively render inoperative the rebate allowed under the above order in respect of coal used for the production of gas for domestic purposes. The rebate of 10s. per ton cannot, therefore, be claimed in respect of coal despatched from a colliery on or after May 12, 1920. Coal despatched from a colliery prior to that date is still eligible for the rebate, notwithstanding the fact that such coal may not have been received by an undertaking until after that date.

The undistributed balance of the rebate deducted from the colliery accounts must be passed on, in due course, to domestic consumers of gas; so that only 5 p.ct. of the aggregate sum received by each undertaking is retained towards the expenses incurred in administering the order.

It is important that all undertakings should, as soon as possible, agree with their suppliers of coal, the actual amount due from them by way of rebate, and that no sum should be included in the balance available for distribution to consumers which has not actually been so agreed.

If this precaution be neglected, an undertaking may find that it has distributed a larger sum than it can recover from the coal suppliers. In this contingency, redress will be almost impossible.

Wherever practicable, it is desirable that the allowance to automatic consumers should continue to be made (as heretofore) at the time when the meters are collected. But, in estimating the rate of the allowance, care must be taken to ensure that both ordinary and automatic consumers receive approximately the same amount per 1000 c.ft., and that the consumption upon which the allowance is made is extended over approximately equal periods. It is suggested that if a period of six months' consumption be adopted as a basis, consumers taken as a whole will receive fair treatment.

Edward J. Fottrell, Manager,
National Gas Council.

39, *Victoria Street, S.W., May* 17, 1920.

Coke Prices.

Sir,—The increases of 4s. 2d. and 14s. 2d. in the prices of industrial and domestic coal respectively, place the matter of coke prices in the relative position which obtained prior to Dec. 1, 1919, at which date the Coal (Pit's Mouth) Prices Order and Direction, 1919, came into force.

Instructions to review existing coke prices have been issued by the Coal Mines Department to divisional officers. Every undertaking outside the Metropolitan area is, therefore, advised to apply forthwith to its local fuel overseer for authority to increase the maximum price of coke by 4s. 2d. per ton. Every undertaking which has not already done so is advised to make application at the same time for authority to add to this price an additional amount equal to that authorized in the case of coal merchants to cover the increased transport charges on coal.

Edward J. Fottrell, Manager,
National Gas Council.

39, *Victoria Street, S.W., May* 17, 1920.

South Suburban Standard Price per Heat Unit.

Sir,—With reference to a statement in your current Editorial Notes, that "the South Suburban Company's proposed standard price was put down 1d. to 1s. 2d. per heat unit," may I point out that the reduction made was from 1s. 2d. to 1s. 1d. per heat unit—the calorific value standard having been increased from 450 to 475 B.Th.U., while the standard price remains at 5s. 2d. per 1000 c.ft.

Chas. Hunt.

17, *Victoria Street, Westminster, S.W., May* 20, 1920.

Oxide Purification.

Sir,—After perusing Mr. Weyman's letter in your last issue, I have come to the conclusion that there must have been some misunderstanding on my part with regard to the conditions to which the statements in Mr. Weyman's paper referred, inasmuch as he now quotes an example in which hydrogen sulphide dried over calcium chloride was used for an experiment. As the paper did not contain any statement with regard to concentration of hydrogen sulphide, I naturally assumed gas-works conditions—concentration of hydrogen sulphide of the order of about 1 volume p.ct.

There is a marked difference in the influence of moisture in the case of concentrated and dilute hydrogen sulphide. If dry dilute hydrogen sulphide is used, the reaction (oxidation and sulphidation) becomes very slow, which is even more pronounced when the gas is dried with concentrated sulphuric acid and phosphorous pentoxide. As a matter of fact, calcium chloride is not energetic enough as a drying agent; so that sulphuric acid and phosphorous pentoxide have to be employed, if true results with absolutely dry gas are to be obtained. The difference in the behaviour between concentrated and dilute hydrogen sulphide can be explained by the fact that concentrated hydrogen sulphide produces so much more water, which is not carried away by the scavenging action of the diluents. The accumulating moisture occludes the particles of iron oxide and impedes the reaction. On the other hand, the dry inert gases used as diluents with hydrogen sulphide act as drying agents to the iron oxide, which loses an undue proportion of moisture, unless precautions are taken that the requisite amount of moisture in the oxide is maintained.

With regard to the function of water in the oxidation process, I should like to remind Mr. Weyman of the oxidation of ordinary iron sulphide as used for the generation of hydrogen sulphide in the laboratory, which is only oxidized at ordinary temperature when moisture is present. According to my experience, the addition of steam or even a spray of water to the gas always brings about a rise of temperature in the purifiers. This seems to indicate that the oxidation process is promoted by moisture and not prevented.

Whatever interpretation to "activity" and "efficiency" of a purifying material may be given, I venture to submit that the activity of an iron oxide (even as Mr. Weyman explains it), is generally increased by a fine state of division. In a particular case, a pure ferric hydrate ($Fe_2O_3.2{\cdot}784H_2O$) was passed through a 76-mesh and a 183-mesh sieve. The finer portion, which passed through the 183-mesh sieve, only absorbed 96·6 p.ct. of the theoretical quantity of H_2S; whereas the coarser material only reached 19 p.ct. of the theory. The same results being obtained under similar conditions with the most diverse oxides, I think sufficiently prove the accuracy of my statements.

My remarks with regard to the solubility of hydrogen sulphide in water were of quite a general nature and not intended to suggest a liquid purification process. However, patent literature reveals that processes are actually suggested which only depend on the solubility of gases in liquids. Likewise, the temperature of 20° C., quoted in this connection, was not in reference to purification.

G. W. Anderson.

Brockley, S.E., May, 20, 1920.

Rings for Filling Absorption Towers.

Sir,—I notice in the "Journal" for May 18 a description of a patent for "Rings for Filling Absorption Towers, &c." (No. 139,880).

During the year 1917, when the demand for benzol was very urgent, the writer invented (but did not patent) these rings, and devised a machine for making them. Our own absorption towers were filled with the rings; and excellent results were obtained. In the same year, several tons of strip metal, and a machine for making the rings, were supplied to a large chemical works in Yorkshire.

The design and method of making the rings was also explained in the same year to one of the staff of the Ministry of Munitions; and as the writer considered it his duty to afford every assistance to the country at that time, he placed no restrictions upon the use of the idea. Some thousands of the rings have also been supplied to a chemical works in Scotland.

One can imagine the writer's feelings at seeing his ideas patented by another party nearly three years after they have been put into practice.

A sample of our 1917 ring is enclosed.

F. V. Barnes.

Todmorden Gas-Works, May 19, 1920.

Central Charging of Coal to Continuous Vertical Retorts.

Sir,—The Chief Chemist to the Woodall-Duckham Company is reported in the "Journal" for May 11, p. 316, as saying:

> "Since the beginning of vertical-retort practice, many improvements had been made; and he did not think that, with the *new central* type of *coal-feeding* hopper, sticking of coal high-up in the retort was at all likely."

This testimony to the correctness of the central-feed is excellent; but seeing that this technical advance was first introduced with the Dempster-Toogood system in the year 1911, forms the subject-matter of their patented central-feed, and has been exclusively used for the past nine years on all their installations, it cannot to-day be termed a "new improvement."

H. J. Toogood.

Elland, May 16, 1920.

Gas-Stove Makers' Prices Increased.

The gas-stove makers are intimating to their customers that, owing to further increases in the cost of materials and wages, all goods will be invoiced at the following revised rates: Listed goods will now be list prices net, except gas-steam radiators, which will remain for the present at list prices less 10 p.ct. discount. Goods charged at net prices will be advanced 10 p.ct., except parts and fittings, the prices of which will remain unaltered for the time being (enamelled parts excepted). Enamelled goods, including crown-plates, whether supplied with cookers or for renewals, will be advanced 50 p.ct. on the present list prices. With a view to assisting gas undertakings as far as possible in face of the serious cost to them of maintaining their cookers in stock and on the district, it has been specially arranged to sacrifice for the present the advance in the price of parts and fittings, except in the case of enamelled goods, which will be increased owing to the heavy increases in costs of materials for these. The above advances do not cover present increased costs; and unless materials and wages show a reduction, a further advance will have to be made on all goods dispatched after Aug. 1 next.

Drogheda Gas Undertaking.—It has been decided to employ a consulting engineer to report on the Drogheda Gas-works, with a view to reducing the cost of production by installing water-gas plant or a system of vertical retorts. An estimate of £800 deficit on the working for the present financial year was made, in consequence of the increased price of coal. Last year's deficit amounted to £3600.

Prestatyn Gas Undertaking.—When the annual budget was being considered by the Prestatyn Urban District Council, it was stated that a department that had brought in more revenue than was anticipated was the gas undertaking, which they had to thank for £1186 more than was estimated. Both the gas and water works had been paying concerns during the past year. Not one penny of the rates had been needed to subsidize either. On the contrary, they had contributed to the relief of the rates the sum of £411, the equivalent of a 6d. rate. The Gas Committee, however, found it necessary to increase the price of gas for the ensuing year by 6d. per 1000 c.ft. owing to increased labour and maintenance charges.

REGISTER OF PATENTS.

Gas-Lamps.—No. 141,464.

INGRAM AND KEMP, LTD., and FOSTER, T. J., of Birmingham.

No. 4759; Feb. 26, 1919.

This invention relates to gas-lamps fitted with bowls suspended by rods, chains, or the like, below the ceiling for illuminating the room by indirect or diffused light; and it has for its object to provide improved means for tilting the bowl independently of the burner or burners.

The bowl-carrying means are supported from a part of the gas supply pipe and pivoted at the extremities of arms branching from the upper part of the fitting and from the part carrying the burner, so that the burner is undisturbed, and is readily accessible. The part of the gas supply pipe which passes round the perimeter of the bowl carries the gas-cock, and is so arranged that the cock is in an accessible position and permits the bowl to be swung by means of the handle of the cock.

Destructive Distillation.—No. 141,505.

STAFFORD, O. F., of Oregon, U.S.A.

No. 9491; April 14, 1919.

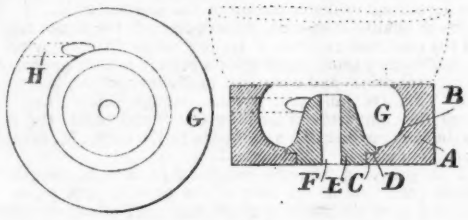
This is a patent of addition to No. 119,040—dated Sept. 10, 1917. The present improvement or modification consists in the application of the treatment referred-to to the carbonization of cellulosic or ligneous material other than wood. As examples of such material, the patentee mentions particularly the following: Cotton seed hulls, rice hulls, peat, nut shells, fruit pips, straw, vegetable fibre, bagasse, moss, or other materials consisting either entirely or largely of cellulose, or equivalent carbohydrate materials. The process of treating this class of material is particularly applicable to (although not limited to) the treatment of material in a finely-divided or comminuted state.

Gas Burning Devices for Heating Domestic Utensils.—No. 141,509.

IONIDES, A. C., jun., of Porchester Terrace, W.

No. 9880; April 17, 1919.

The invention relates to domestic heating devices in which a practically closed combustion chamber is formed by a fire-clay block having an annular recess and central outlet, and a culinary vessel acting as the enclosing wall. It also consists in a heater constructed of a refractory block having an annular recess or trough on its upper face into which enters tangentially a delivery passage for the mixture of gas and air in self-burning proportions, and an exit flue provided by a central vertical hole in a central dome-shaped portion of the block surrounded by the trough—the whole being closed, when in use, by a culinary vessel placed upon the fire-clay block.



Ionides' Gas-Burning Device.

A sectional elevation and plan of one form of the apparatus is given. Here the lower and side walls of the combustion chamber are formed by a ring A of refractory material (fire-clay), having a curved inner surface B, and a central aperture C with a recessed seating D. Accurately fitting the recessed aperture C is a dome-shaped central portion C, the top of which is a little below the level of the top of the outer ring. It is provided with a central vertical flue or outlet passage F, through which the products of combustion escape directly to the atmosphere, or are discharged by way of a jacketing space. The two portions of the block, when fitted together, provide an annular trough-like recess G, having upon one side an inlet passage or orifice H placed tangentially with regard to the centre of the trough. The orifice admits a mixture of gas and air carefully proportioned as indicated, by means of a valve or cock having adjustable controlling apertures as described in patent No. 5984 of 1915—the orifice being, if desired, provided with a combustion nozzle of the type described in patent No. 106,546 or No. 108,701.

The correctly proportioned mixture of gas and air admitted through the orifice will burn in the trough G, and any vessel placed upon the block and resting on the outer periphery forms a cover, and thus provides an enclosed chamber in which combustion continues without the admission of any further supply of air—the products of combustion escaping through the passage F.

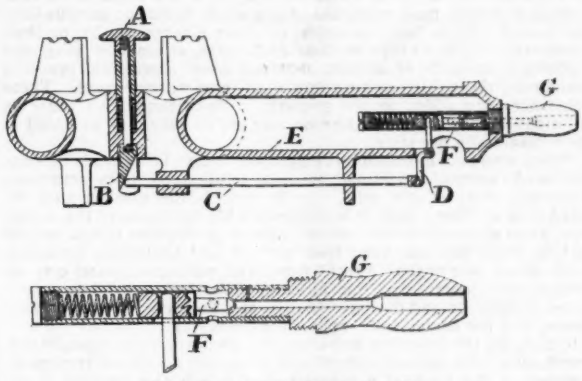
It is said that this device enables about 80 p.ct. of the heat energy in the gas to be utilized as heat in water or other liquids contained in a kettle or other utensil employed.

Gas-Stoves, Gas-Rings, &c.—No. 141,511.

WAKELING, T., of Shepherd's Bush, and GARDNER, J., of Acton Vale, W.

No. 10,091; April 22, 1919.

According to this invention, the gas-burner or ring comprises a tube leading into a burner, an outlet for gas at the end of the tube, a slidably mounted valve controlling the inlet of gas, a slidably mounted rod disposed exterior to the tube, a lever connecting one end of the rod with the valve, and a slidably mounted plunger associated with the burner and adapted to be operated by a utensil, the lower end of the plunger having an inclined slot, the inclined base of which engages with the free end of the rod.



Wakeling and Gardner's Gas-Ring.

A longitudinal section of the gas-ring is given; also a detail of the gas-jet and sliding valve.

The gas-ring is provided with a bearing in which is mounted a vertical rod, with a head piece or cap A screwed upon a rod fitted on a spring. At the lower end of the rod is a piece B having an inclined slot which bears upon the end of the horizontal sliding rod C. The end of the rod engages with one end of a pivoted lever D mounted to turn about a pivot on the underside of the passage F leading to the burner. The upper end of the pivoted lever engages in a transverse slot in the body of the sliding valve E. This valve is mounted to slide in a tubular guide screwed upon the end of the jet G; and a spring engages against the shank of the valve so as normally to press it into the outlet aperture of the jet and thus prevent the passage of gas past the valve. A bye-pass jet is provided to permit a small quantity of gas reaching the burner (when the valve F closes the outlet) so as to maintain a small pilot light constantly burning.

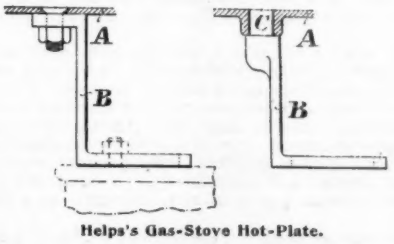
The head piece on the plunger projects slightly above the carrying brackets on the gas-ring, so that when a kettle or other utensil is placed upon the brackets its weight will press down the plunger and cause the rod C to slide in its bearings against the action of the spring, thereby turning the pivoted lever D, and drawing back the valve F so as to open the outlet from the gas-jet G, and permit the gas to pass into the passage E, and thence to the burner.

Hot-Plates for Gas Cooking-Stoves.—No. 141,638.

HELPS, GEORGE, of Nuneaton.

No. 29,575; Oct. 5, 1918.

The patentee remarks: "As all the ordinary existing cookers are most extravagant in use and require to be refitted with new hot-plates, I have designed a hot-plate with special provision for allowing it to be fixed to the top of any cooker in the shape of short legs of L form having two eccentric centres so that they may be turned on a pin fixed to the hot-plate top."



Helps's Gas-Stove Hot-Plate.

The hot plate A in the first arrangement shown is bolted on a flange formed on the top of a leg B. But in the modification shown on the right the leg terminates in a pin C, while the plate A is formed with a socket with which the pin engages. This construction allows the hot-plate to be easily removed. Or the leg may terminate in a socket, and the underside of the plate be provided with a pin which engages with the socket.

Manufacturing Sulphate of Ammonia.—No. 141,787.

LINDER, S. E., of Buckhurst Hill, Essex, and LESSING, R., of High Holborn, W.C.

No. 1313; Jan. 18, 1919.

This invention relates to the treating of commercial sulphate of ammonia with an agent adapted to neutralize the small proportion of acid contained therein.

The invention is based upon the observation that by subjecting commercial sulphate of ammonia to the action of an agent adapted to effect the neutralization of free sulphuric acid, and simultaneously to agitation and drying, under the action of heat, "a dry product of satisfactory physical properties may be obtained." When the sulphate is also subjected to treatment to effect the mechanical reduction of the salt, a

dry and granular or pulverulent product is obtained. The patentees have also found that by neutralizing commercial sulphate and drying it under suitable conditions—as, for instance, by heating the sulphate in a partial vacuum or in a gas current—the pyridine normally contained in the salt can be removed and recovered. As agents adapted to effect the neutralization of the sulphuric acid contained in the commercial sulphate, basic materials in the solid, liquid, or gaseous form are named. Thus lime, magnesia, or other alkaline earths, or their carbonates, fixed alkalies or their carbonates, ammonium salts—the carbonate, sulphide, or sulphite of ammonia—or commercial products containing these salts, or ammonia itself, may be employed. These substances are added to the sulphate in association with water as solutions or suspensions as the case may be, or they may he added in the substantially dry state.

When ammonia in solution is employed, it may be as crude or concentrated ammoniacal liquor or as a solution of pure ammonia. Ammonia, or its volatile salts, may be used in the gaseous form instead of in solution; and, in accordance with this phase of the invention, gases obtained in the carbonization or gasification of coal or like carbonaceous material, freed from tar but still containing ammonia (such as are used in the "direct" process of making sulphate) may be brought into contact with the sulphate, while the latter is being subjected to agitation and drying. In this case, the gases containing ammonia, if in the heated state, may effect the drying.

In carrying the invention into effect [no illustration accompanies the specification] the apparatus employed comprises a rotating treatment chamber in the form of a cylinder, into which the material to be treated is charged, and having means whereby the gases or vapours may be withdrawn, and having also means for heating the contents. The apparatus may be of the kind containing grinding bodies—for instance, balls or pebbles. The drying may be effected as indicated by heating means associated with the treatment chamber, or by heated gases passed through the chamber. The gases and vapours exhausted from the chamber may be treated, as indicated, for the recovery of pyridine and any excess of ammonia. To this end they may be passed through a device adapted to effect the condensation or absorption of the substances with or without the employment of a suitable absorbent. Thus the gases or vapours may be passed through a scrubber or tower fed with water, or an acid solution, or with an oil.

The following particulars are given to illustrate certain ways in which the invention may be carried into effect: 100 parts of sulphate of ammonia, containing (say) 2 parts of water, and 0·4 part of sulphuric acid apart from other impurities, are charged into the drum of a ball mill containing a light charge of balls or pebbles, and heated by gas-burners or other means; and 0·4 part of dry hydrated lime in powder form or a quantity of concentrated ammonia liquor containing an equivalent amount of ammonia are added. The drum is then rotated, and neutralization takes place very quickly. Air is blown or sucked through the drum, which is provided with hollow trunnions; the escaping air, charged with moisture together with any excess ammonia or pyridine which may be given-off, being passed through a scrubber supplied with an acid solution of sulphate of ammonia—mother liquor from the saturator. When gas-burners are employed as heating means, the hot products of combustion of the gas may be confined within a hood or casing, and it may be convenient to form the bottom of this in the shape of a hopper to be used for the discharge of the finished sulphate of ammonia.

For a charge of from 2 to 4 cwt. from twenty to thirty minutes' drying is sufficient. After this the air current is cut off, and the sulphate is discharged by placing a grid in the manhole and rotating the drum.

If continuous working is desired, plant of the tube mill type will be found convenient. In this case the air enters the plant where the finished product is discharged, and leaves at the end where the sulphate and its neutralizing agent are introduced. Where coal gas carrying ammonia is used as a combined neutralizing and drying agent, the feeding and discharging ends must be provided with gas-tight mechanism.

When it is desired to make a salt free from pyridine, sufficient neutralizing agent should be added to satisfy the free acid, and the acid combined with the pyridine in the original sulphate. Thus, by using ammonia in the form of concentrated liquor or ammonia carried by coal gas in excess and recovering the balance, it is possible to produce sulphate having an ammonia content equal to that of the chemically pure salt—retaining only a trace of moisture; "the granular product consisting of broken crystals and resembling silver sand and being of a chemical and physical quality hitherto unknown as a commercial article."

To illustrate the composition of the sulphate produced in accordance with the invention the following particulars are given:

Moisture	0·05 per cent.
Free acid	*Nil* ,, ,,
Pyridine	*Nil* ,, ,,
Ammonia	25·72 ,, ,,

Manufacturing Gas.—No. 141,828.

Holt, C. E., and Walker, T., of Wilmslow.

No. 2706; Feb. 4, 1919.

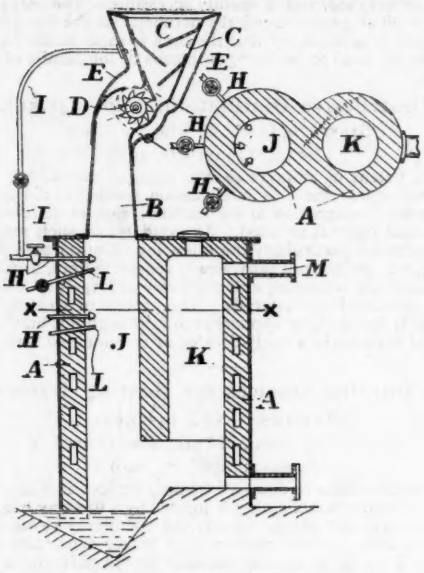
In carrying out this invention the patentees supply coal in a pulverized condition to a retort, at or about the same time as steam at low pressure for mingling therewith. The powdered coal is caused to enter the reaction chamber in as dry a condition as possible by passing through a fixed jacketed and heated hopper. It is supplied at a comparatively low pressure, so as to flow gently into the heat zone of the retort to meet the falling coal dust, which has been dried, as stated, before entering the reaction chamber of the retort. The preliminary drying takes place as early as possible—namely, in the feeding hopper of the apparatus situated externally to the reaction chamber.

A sectional elevation of the retort is given; also a sectional plan through line X

The retort A is heated by furnace gases through surrounding flues, and has an extension B above, to which the pulverized coal is led by a hopper C having a reduced mouth from which the coal is ejected. The hopper is provided with a toothed member D attached to a revolvable shaft driven by suitable power in gear with the exhauster, so as to adjust the feed of coal relatively to the amount of gas being drawn-off from the retort.

The hopper is provided with a casing E into which steam is passed, so that the pulverized coal within is kept dry before it enters the retort. Baffles or deflectors in the hopper prevent the whole weight of the coal coming directly upon the wheel D, and so delay the fall of the coal through the hopper.

The retort is provided with inlet pipes H for steam; while a pipe I enables steam to be fed to the jacket E. The steam issuing from the ends of the pipes H is ordinary low-pressure steam of saturation, or



Holt and Walker's Gas-Making Plant.

even superheated steam, according to the degree of heat to be maintained.

The proportion of the volume of steam to that of coal supplied may be varied according to the condition of the gas required. If a large make of lower quality in thermal units is desired, the steam may be in excess of the coal, and *vice versâ*. By the use of slowly moving steam and the conditions named there results merely ash (or approximately so) after carbonization, and complete gasification of the heat zone referred to. This ash falls into a water trough below; and the gas passes from the compartment J of the retort and under the dividing wall into the compartment K, and thence to the outlet M, assumed to be in connection with a hydraulic seal.

Pipes L are provided whereby enriching oil may be supplied with the steam or coal. As in the case of the pipes H, the pipes L employed depend upon the position of the heat zone relatively thereto.

Manufacture of Ammonium Sulphate.—No. 141,798.

South Metropolitan Gas Company, Evans, E. V., and Hollings, H.

No. 1427; Jan. 20, 1919.

The patentees, in their specification, remark: Ammonium sulphate made by certain processes—notably that devised by Feld—has one important advantage over that made by the process which consists in passing ammonia into sulphuric acid, as generally practised in this country. This advantage is that the Feld sulphate is a dry material which does not cake in the bags in which it is packed for transport and storage. The ammonium sulphate made in this country, on the other hand, is seldom dry, and when it is received by the farmer has to be broken-up from its caked condition, particularly when it has to be passed through an agricultural drilling machine. We have found that it is the residual acid in the ammonium sulphate made by the British process that is the cause of the difference between this sulphate and that made in Germany. If the sulphate is acid, as (for well-known reasons) it practically must be when made in an ordinary saturator, it will cake when packed, even though it has been dried. If the acidity is neutralized before the salt is dried, caking is avoided. As the Feld process and certain others happen to produce a neutral sulphate, a non-caking salt is obtained; but the reason does not appear to have been recognized.

The present invention consists in passing ammonia into sulphuric acid and separating the crystals in an acid condition from the liquor. The special feature resides in neutralizing these crystals (in any manner known to be suitable) and then drying them at a raised temperature. They can then be packed, after having been crushed if necessary. The limiting temperature at which the drying may be conducted is that at which ammonium sulphate begins to decompose; but in practice the temperature can seldom be carried above 130° C. without injuring the colour of the material. Such a high temperature is not necessary, however, although it may be advantageous when it is desired to hasten the drying operation.

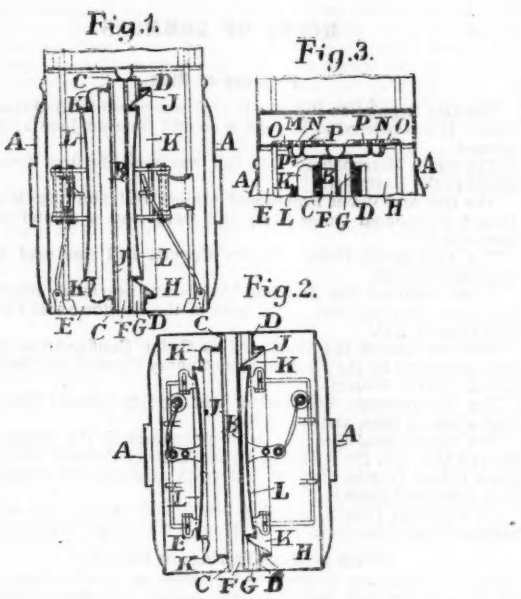
A suitable mode of drying the neutralized ammonium sulphate consists in causing it to descend a tower in which it is properly distributed, and up which air is passing at such a temperature that the ammonium sulphate attains a temperature of 80° to 100° C. The salt may be made to circulate through this tower until dry; then it is conveyed to the crusher. The degree of fineness to which the sulphate is crushed depends on the purpose for which the sulphate is to be used.

Gas-Meters.—No. 141,847.

AUTO SLOT GAS-METER COMPANY, Ltd., and GOLDSPINK, G. E., of Nottingham.

No. 4626; Aug. 25, 1919.

This invention in dry gas-meters has for its object "to increase the capacity of such meters without increasing their size—that is, construct them so that they will pass a considerably increased volume of gas in a given period of time.



Goldspink's (Auto-Slot Gas-Meter Company) Gas-Meter.

Fig. 1 is a vertical cross section, and fig 2 a sectional plan of a gas-meter constructed according to the invention; while fig. 3 is a section taken across the slide-valve ports.

The body A of the meter is divided by a central partition B, and two subsidiary or bellows partitions C and D, into four compartments E, F, G, and H—that is, two inner compartments F and G on each side of the central partitions B, and two outer compartments E and H. The two bellows partitions (which are parallel to the central partition) are each formed with an opening J in the middle, over which the corresponding bellows K, which is preferably of circular form, is mounted; and the latter is so constructed that the movable end or head L of each bellows, which is made less in diameter than the opening J, can pass right through the latter. The bellows are made of a tapered circular sleeve—that is, conoidal—and the larger end of each is attached to a rim disposed on the outer sides of the corresponding bellows partitions C and D. The movable end or head L of each bellows K, which forms the smaller end, can thus move from one side to the other of its carrying partition—that is, out of one compartment into the other—instead of moving up to and away from the fixed point of the bellows attachment as is usual with this form of bellows membrane. The volume of gas admitted into one compartment (say E) and displaced from the other (F) is therefore much greater than when the bellows are arranged in the usual manner, and the capacity of the meter is correspondingly increased.

The slide-valves and ports in the valve chamber M (fig. 3) are arranged as usual, and controlled by slide-valves of ordinary construction. The central ports N of the two sets are connected by casings to the outlet; the outer ports O are connected directly to the respective outer chambers E and H; and the inner ports P are connected by casings to the respective chambers F and G.

This arrangement permits of the use of bellows of circular cross section; and these can be readily replaced when damaged. The mechanical connections to the bellows are of the usual construction, arranged in the usual manner; and the only alteration required is in the ratio of the gearing which connects the recording mechanism to the main crank-shaft. This gear-ratio must be adjusted to meet the increased bellows capacity—a contingency that can be met by using (say) five-light meter registering mechanism in a meter of the ordinary three-light size.

Manufacture of Sulphate of Ammonia.—No. 141,799.

SOUTH METROPOLITAN GAS COMPANY and WEIGHT, O. W., of Bromley, Kent.

No. 1428; Jan. 20, 1919.

The use of a solution of ammonia, gaseous ammonia, or an alkaline compound of ammonia for neutralizing the free acid contained in sulphate of ammonia as generally made, is open to the objection, the patentees mention, that if any excess of the neutralizing agent is used, ammonia is lost, and the sulphate of ammonia is temporarily or permanently rendered alkaline. Moreover, the re-agent generally loses ammonia in being handled.

By the present invention the sulphuric acid adhering to the crystals removed from the saturator is neutralized by means of ammonium sulphite or bisulphite, "which is particularly advantageous in that any excess which may be used oxidizes to ammonium sulphate."

The ammonium sulphite or bisulphite, in the solid state or in solution, is mixed with the crystals which have been removed from the saturator either before or after they have been washed, or it may be added to the washing liquor. One method of mixing solid ammonium sulphite or bisulphite with solid ammonium sulphate consists in feeding it to the crusher through which the sulphate is generally passed—the rate of feed being such as to ensure the admixture with the sulphate of a proportion of sulphite or bisulphite containing ammonia equivalent to the free sulphuric acid in the sulphate. When the sulphate is subjected to a final drying operation, it is advantageous to apply the sulphite or bisulphite in solution; and it may be sprinkled over the sulphate on a conveyer.

No particular directions are needed for the use of the solution as a liquor for washing the ammonium sulphate. In any case the ammonium sulphite used is sufficient to neutralize the free sulphuric acid, and may be in excess of this sufficiency to the extent of from 0·1 to 0·5 p.ct. of the final product.

Manufacture of Neutral Sulphate of Ammonia.—No. 141,819.

SOUTH METROPOLITAN GAS COMPANY, PARRISH, P., of Blackheath, and VALON, W. A. M'I., of Stafford.

No. 1744; Jan. 23, 1919.

The patentees preface their specification by saying: Ammonia would be the most advantageous agent for neutralizing the acid which remains in sulphate of ammonia as ordinarily made. The ammonia, however, must be free from the sulphuretted hydrogen and certain volatile matters which accompany it as it leaves the "free" ammonia still. This is the case with the ammonia that leaves the separate chamber of the still, or the separate still in which the "fixed" ammonia is liberated; and it has been attempted to apply the vapours (or a portion thereof) that leave this fixed ammonia still to the neutralization of the sulphate of ammonia by directing the vapours on to the crystals in the centrifuge after the mother liquor has been as far as possible expelled. There is considerable loss of ammonia, however, during the operation. Condensing the vapours from the fixed still (or chamber serving this purpose) and using the ammonia solution thus obtained suggests itself as a means for avoiding the loss. This might be the case if the ammonia solution could be used at the ordinary temperature; but we have found that this is impracticable because the sulphate of ammonia crystals in the centrifuge and the liquor adhering to them are so much chilled that further crystallization occurs, and the centrifuge becomes choked—preventing drainage of the added water. The ammonia solution condensed from the fixed ammonia still must, therefore, be used at a temperature at which the vapour-pressure of the ammonia in it is so considerable that the loss of ammonia is comparable with that which occurs when the vapours from the still are used.

By the present invention the vapours from the fixed ammonia still are condensed, and the solution of ammonia thus obtained is used at a raised temperature for spraying the crystals, but is first diluted to such a strength that at the temperature employed the vapour-pressure of the ammonia in it is too low to entail substantial loss of ammonia. This temperature, and the consequent degree of dilution of the ammonia solution, varies with the practice at the particular works, since the degree to which the crystals have cooled by the time they are drained depends on several factors. It is advantageous that the temperature should be the lowest practicable, since the higher it is the more sulphate of ammonia passes into solution. Again, the lower the temperature the greater the strength at which the ammonia solution can be used, which means less loss of sulphate of ammonia dissolved in the neutralizing operation.

A particularly suitable diluent for the condensed vapours is said to be furnished by the invention. It is impracticable in the fixed ammonia still to expel all the ammonia; but the patentees have found that by subjecting the hot waste liquor from the still to a slightly reduced pressure, steam containing a considerable fraction of the ammonia left in the liquor can be withdrawn and condensed to a weak ammoniacal liquid suitable as the diluent in question—particularly if condensed at a temperature appropriate to that at which the vapours from the fixed ammonia still have been condensed.

As an example there may be cited the application of the invention when it is desired to neutralize crystals the temperature of which is about 75° C. by the time the mother liquor has drained from them. In this case the temperature of the ammonia solution used for washing should preferably be between 60° and 70° C., and its strength about 0·5 p.ct. of NH_3. Such a solution may conveniently be obtained by condensing the vapour from the ammonia still at 60° to 70° C., and diluting the condensate with water at this temperature to lower its strength to that stated. Preferably, however, there is used as the diluent the condensate obtained by connecting with an ejector through a condenser the upper part of a tank through which the waste liquor from the ammonia still runs away. The pressure in the bottom of the still being some 8 in. of mercury above atmospheric pressure, that in the tank should be from 4 to 8 in. below atmospheric pressure; and such a condition causes the condensation in the condenser of a solution of ammonia of about 0·25 p.ct. strength.

Hydraulic-Mains.—No. 142,026.

R & J. DEMPSTER, LTD., and BEARD, G. F. H., and TOOLEY, G. W., of Manchester. No. 24,171; October 3, 1919.

The invention relates to combining two already known systems of hydraulic mains. That is to say, in patent No. 2861 of 1904, there is

described a system wherein a separate hydraulic main is provided for each retort or group of retorts. With this arrangement, the ascension pipe connections to the mains are uniform in character, as also are the valves; but the number of the latter and of the mains are considerable. In patent No. 25,783 of 1905, is described a system wherein one main is divided into sections, so as to form a separate seal for each tier of retorts. With the use of this arrangement, complicated plant is said to be requisite, "involving ascension pipes of varying lengths, as well as multiplicity of valves and gear for their operation." In order to make the combination produce the desired effect, the proposal here is to make use of a single main divided into sections on the one hand, and of ascension pipe connections of uniform character on the other hand, with the sections disposed in manner to be described.

Fig. 1.

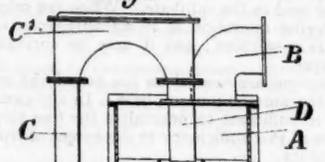


Fig. 2.

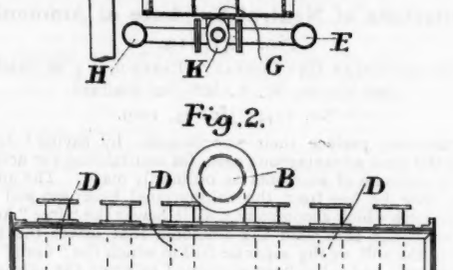


Fig. 3.

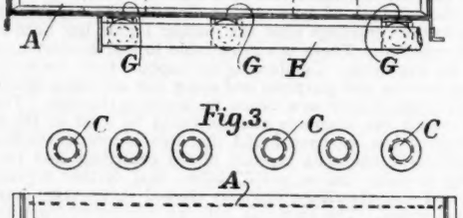
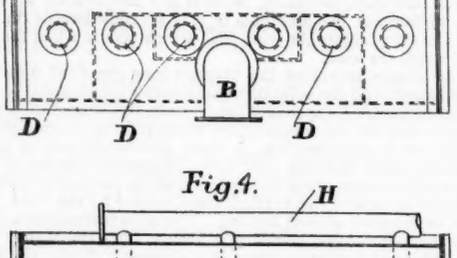


Fig. 4.



Beard and Tooley's (R. & J. Dempster) Hydraulic Main.

Fig. 1 is a sectional end elevation of the main and connections. Fig. 2 is a side elevation of fig. 1—the ascension pipe connections being, however, removed. Fig. 3 is a plan. Fig. 4 is a section along a plane parallel to fig. 3—the dip pipes being removed.

A is the main proper, provided with three sections. The gas outlet at B leads to the gas-main (not shown). Ascension pipes C, with connections, lead to the dip pipes D. E is an inlet main for liquor, when required, with pipe connections leading to the outlets at G. H is the outlet main for the liquor in connection with the outlets at G. Valves (not shown) are provided near the parts G—a facing for one such valve being indicated at K in fig. 1.

The sections of the main A are disposed relatively to each other, so that the dip pipes D are brought into line; and the liquor valves and outlets at G are similarly affected. Thus the main and parts connected with it are as a whole "simplified in construction and arrangement . . . being easy in accessibility and uniform in character."

The Gas Committee of the Lanark Town Council visited the Cupar Gas-Works, and inspected the system of vertical retorts there. It is estimated that a similar installation at Lanark would effect a yearly saving of £2069. There would also be a much better production of gas. A further report is being obtained.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Public Utility Companies (Capital Issues) Bill and the Rugby Gas Bill received the Royal Assent.

The South Suburban Gas Bill was reported from the Select Committee, with amendments.

The South Metropolitan Gas Bill was read the third time, passed, and sent to the Commons.

The Pontypridd Urban District Council Bill and the Redcar Urban District Council Gas Bill were brought from the Commons, read the first time, and referred to the Examiners.

HOUSE OF COMMONS.

Progress of Bills.

The Gas Regulation Bill [see p. 425] was presented and read the first time. It was ordered to be read a second time on June 2, and to be printed.

The South Metropolitan Gas Bill was read the first time, and referred to the Examiners.

The Gas and Water Provisional Orders Bill and the Ministry of Health Provisional Order (Gas) Bill were read a second time, and committed.

The Pontypridd Urban District Council Bill was read the third time, and passed.

It was reported that Standing Orders not previously inquired into had been complied with in the case of the Newtownards Urban District Council Bill.

Petitions against the Watford Gas Order Confirmation Bill have been presented by the Hertfordshire County Council and the Watford Urban District Council.

The Wandsworth, Wimbledon, and Epsom District Gas Bill was read a second time, and committed.

The Maidenhead Gas Bill (with amendments). the Redcar Urban District Gas Bill, the Rhondda Urban District Council Bill, and the Risca Urban District Council Bill (with amendments) were read the third time, and passed.

On Tuesday, June 8, the Gas Provisional Orders Bill will come before a Committee, with Sir W. Howell Davies as Chairman.

Effect of Road Tarring on Fisheries.

Sir A. BOSCAWEN, in reply to questions by Sir F. Blake, said he hoped to be able to introduce this session a Fisheries Bill, which would, among other things, deal with river pollution. An Inter-Departmental Committee was investigating the question of road tarring in relation to fisheries. Their inquiry necessarily embraced the consideration of other pollutions which might co-exist with road-tar pollution.

Government Benzol Stocks and Sales.

Mr. HOPE, replying to a question by Mr. A. Yeo, said that the stock of benzol on Nov. 11, 1918, which the Ministry of Munitions held, or was under contract to acquire, was approximately 11,700 tons of standard benzol and 9800 tons of pure benzol. All the pure benzol was transferred to the Board of Trade and all the standard benzol was sold by Oct. 7 last, with the exception of about 100 tons subsequently notified for disposal, which was sold by March 20 last. The average price obtained for the standard benzol was 1s. 8½d. per gallon on spot.

Smoke Abatement.

Dr. ADDISON, replying to a question by Mr. Sugden, said that a Departmental Committee had been appointed to consider and advise what steps were desirable and practicable to diminish the evils arising from pollution of the atmosphere by smoke and other noxious vapours. The responsibility for Government research in connection with fuel rested with the Fuel Research Board, whose annual report had been recently issued.

Public Utility Companies (Capital Issues) Bill.

Mr. BRIDGEMAN (the Parliamentary Secretary to the Board of Trade), in moving agreement to the Lords Amendment in the above Bill [see "JOURNAL" for May 11, p. 321] explained that the amendment of the House of Lords merely required that where certain public utility companies intended to take advantage of the provisions of the Bill, they should be required to give notice to the local authorities in the area concerned; the point being that any such action should not take place without the knowledge of the local authorities, so that they might be able to raise any objection during the time when objections could be raised, and while the Order was lying upon the table of the House.

Major BARNES said that he understood that this was an amendment to clause 1, sub-section 1 (*e*), and not to all the sub-sections.

Mr. BRIDGEMAN replied that there were five provisos in the original Bill at the end of the first part, and this was merely an additional proviso to that sub-section.

Major BARNES asked whether sub-section 8, which authorized a higher rate of dividend, applied to capital raised under the Bill or already in existence.

Mr. BRIDGEMAN said the proviso referred to what happened in the earlier part of the clause, and not merely to sub-section 1 (*e*).

Major BARNES asked if this applied to capital raised under the Bill or before the Bill was passed.

Mr. BRIDGEMAN replied that it only referred to the capital raised by the Act, which could not have been raised if the Act had not been passed.

The amendment was agreed to.

LEGAL INTELLIGENCE.

RAILWAY RATES FOR HEAVY NAPHTHA.

The Railway and Canal Commission Court were occupied for four days recently in hearing an application by the Midland, Great Western, and Lancashire and Yorkshire Railways for a declaration that they may charge for the carriage of certain coal-tar products of the naphtha order at a higher rate than ordinary as dangerous merchandise. Defendants were Messrs. Brotherton & Co., Ltd., and Messrs. Wm. Butler & Co. (Bristol), Ltd., acting, it was stated, on behalf of the Tar Distillers' Association.

Sir JOHN SIMON, K.C., who appeared on behalf of the plaintiffs, explained that the railways had no desire to throttle trade; but the defendants consigned products as mineral tar oil without any warning that they were more dangerous than treacle, and obtained naphtha prices from purchasers, to whom the goods were found invoiced as solvent naphtha and high-flash naphtha. He agreed that tar oil given off at a later stage of coal-tar distillation was not dangerous for rail travel. On the other hand, naphtha, from its low flash-point, had to be carried well out of the way of engine sparks. In one consignment sampled the flash-point was as low as 83° Fahr.

Mr. *Leonard Archbutt*, the Chief Chemist to the Midland Railway, described various tests, including the flash-point test. Tar oil, by the evaporation test, lost 1 to 6 p.ct.; samples of this heavy naphtha traffic, 17 to 74 p.ct.

Answering Mr. ROWLAND WHITEHEAD, K.C. (who appeared for the defendants), witness declined to say what flash-point marked the place where naphtha shaded-off into something else. The flash-point of a consignment Messrs. Brotherton & Co. sent to the Weston-super-Mare Gas Company was 83°.

Mr. *John H. B. Jenkins*, the Chemist to the Great Eastern Railway Company, held that naphtha was a spirit derived from the oil and distinguishable from it as petrol was from lamp oil.

Mr. *Horatio Ballantyne* and Mr. *W. J. A. Butterfield* were also called by the plaintiffs as technical experts.

Mr. HOLMAN GREGORY, K.C., who appeared with Mr. WHITEHEAD for the defendants, insisted that the railways had carried these goods under their ordinary schedule as mineral tar oil for forty years; and they wanted now simply to raise the rates. If they applied the evaporation test, they were going to carry nothing but creosote at the old rates. They apparently said there was no intermediate product between naphtha and creosote. Defendants said there was solvent naphtha with a flash at 73°, and mineral tar oil flashing above 100°.

Mr. *Thomas Butler*, Managing-Director of defendant's firm, said the proper test was the flash-point. It had been recognized in the trade for years that anything that flashed at higher than 100° was not dangerous. He had no special precautions for manufacture at his works, and had never had an accident either there or on rail. The railways had for twenty years been trying to raise the rates in this way, and had successively failed. The proper dividing line between naphtha and mineral tar oil was that naphtha alone would burn when a light was applied; mineral tar oil would not unless mixed with sawdust or some other combustible substance. He contended that anything with a higher flash-point than 100° (Abel's closed test) was not dangerous, and that they were entitled to consign it as mineral tar oil.

Mr. *John Lukes* (Messrs. Brotherton & Co.'s Traffic Manager at Leeds) said they consigned large quantities of goods as mineral tar oil. Everything was tested before it left the works; and if anything of a lower flash-point than 100° had gone out, it had been only by inadvertence. Products flashing above 100° were always consigned as mineral tar oil. Customers called the stuff by all sorts of names; and they generally followed the customer's nomenclature on the invoice.

Prof. *G. T. Morgan* also gave technical evidence on behalf of the defendants.

The Judgment.

Mr. JUSTICE LUSH, in the course of his judgment on Thursday last, said the application related to a substance commercially known and dealt with as heavy naphtha, and consigned for many years by the two defendant firms, and, as they said, properly consigned, as mineral tar oil. The Railway Companies said they had ascertained it to be heavy naphtha. Defendants denied that the goods were dangerous, and refused to pay the rate charged. Twenty samples of the products consigned had been analyzed by the Railway Companies. The questions were: (1) Whether the words "mineral tar oil" described this produce specifically; and (2) were the Railway Companies entitled to say they had discovered the goods were dangerous and to be dealt with differently from others. On the evidence of the defendants' witnesses, the expression "mineral tar oil" was not a commercial description of one specific product, but was a generic term. One witness even said benzol was a mineral tar oil. The product in question was known long before the specification was compiled, and mentioned in documents at the time, and described as dangerous. It was omitted from the part of the classification which dealt with oils, and it was impossible to say that when the Legislature used the term mineral tar oil they were referring to this product. He thought it clear that the meaning of the words in the statutory classification was that any mineral tar oil not dangerous was to be placed in the class there and charged accordingly; and the words applied to creosote oil, anthracene oil, and fuel oil. It was left to the Railway Company to say what should be treated as dangerous goods and so classified. The question was whether these products were dangerous within the meaning of the statutory classification and the Rates and Charges Order (Confirmation) Act. The Railway Companies contended it was for them to decide what were dangerous goods; and they said, in as far as they had *bonâ-fide* come to the conclusion that these samples were dangerous, they came properly and necessarily within that class for the purpose of fixing the rate of their conveyance. He thought this contention was right. It was not for the Court to determine whether the goods were dangerous. The term dangerous was a relative term difficult to define. As the determination had been given to the railway, had the Legislature in the Statutory Classification and the Rates and Charges Order (Confirmation) Act, taken the discretion out of the hands of the Railway Company? He found that no such change in the law was intended, and that the Railway Companies had acted *bonâ-fide* and reasonably in treating these samples as dangerous. The way in which heavy naphtha had been dealt with in the railway classification prior to 1892, and the evidence of experts, made its dangers clear. For many years it had been scheduled as dangerous, and special means taken for its carriage and storage. It was not so dangerous as solvent naphtha, and was put into a different class. The Railway Companies were entitled to take the view they had taken. That there had been no accidents might have been the railways' good fortune. The applicants were entitled to the declaration prayed for, that as to the traffic mentioned—naphtha coal tar—they were entitled to treat it as dangerous goods.

All the Commissioners concurred in the judgment.

A Christiania Gas Deputation.

Christiania has been contemplating for some years the construction of a new gas-works; but various things have stood in the way—the obtaining of a suitable site being one of the chief difficulties. It appears that the Norwegian Capital is hemmed in by other communities, and the land on which it is proposed to build the new works is not within the city's boundaries. There is now, however, a prospect of the site question being satisfactorily solved; and it was therefore decided to send a deputation to Britain for the purpose of visiting large gas undertakings, and noting present-day methods of gas manufacture, &c. The first place visited was Edinburgh, where on Wednesday last, the party of four were taken in hand by the Convener of the Works Committee (Councillor James Stewart) and the Engineer and Manager (Mr. Alexander Masterton), and shown over the Granton works. Later the visitors were entertained at lunch, when the Chairman of the Commissioners (Lord Provost Chesser) extended a hearty welcome. In replying to the toast of his health, Mr. Stewart gave some interesting statistics showing the growth of the undertaking; while Mr. J. G. Tooms (the Christiania Gas Engineer), in responding to a similar compliment, remarked that the gas-works of the Commissioners had been laid-out with great ability, and, taken as a whole, were as up-to-date as any he had seen.

National Health Week at Oldham.

In conjunction with Dr. Wilkinson, the Medical Officer of Health for the borough, the Oldham Corporation Gas Department had a special week at their show-rooms for a display of gas appliances of all descriptions for smoke abatement. The arrangements were under the personal supervision of the Distribution Superintendent (Mr. Isaac H. Massey). Good business was done; and the assistants were kept busy pointing out the advantages of a gas-fire in bed-rooms, occasional rooms, and offices, radiators for business premises, workshops, &c.; up-to-date water-heaters for schools, clubs, and other institutions, in lieu of the old-fashioned boiler or large iron kettle, circulators for the new housing schemes, garages, and greenhouses, cookers for domestic use and in large works, small furnaces, tinman's stoves, tailors' irons, domestic gas-irons, gas-heated drying closets, and domestic gas boilers. The lighting section was not lost sight of. Burners of all descriptions were on view, both for inside and outside lighting (showing the advantages of the pneumatic distance lighter), including the special "Oldham" bench-burner, with strong mantle, to be used in place of the old-fashioned double swivel bracket and flat-flame burner. An interesting exhibit was made by the Whelmer Mantle Company, of Oldham, who showed the incandescent mantle from the ramie fibre to the finished article. The Department also exhibited bottled and dried fruit and vegetables prepared during the war at the various demonstrations in the show-rooms, by the Demonstrator from the Board of Agriculture and their own assistants.

Cost and Shortage of Coal in Ireland.—The Alliance and Dublin Consumers' Gas Company's officials state that the increase in coal cost will entail an annual extra outlay to the Company of over £60,000. The additional cost on the industrial coal increase alone would be £20,000. The shortage of coal in Ireland—especially in Dublin—continues; and public bodies are urging on the Government Departments concerned the necessity of immediate action.

Sulphate of Ammonia Export.—Referring to the subject of sulphate of ammonia export prices, the "Times" last Thursday said: We gather that correspondence has recently been passing between various bodies, official and private, on the subject of the export price of sulphate of ammonia. It appears that the price in the United Kingdom of this important fertilizer has been about £25 a ton; but the controlled price to Mauritius, Ceylon, and the West Indies has been from £37 to £40 a ton. The argument of the West India Committee is that any supplies available after the requirements of home agriculturists have been satisfied should be offered to British consumers abroad at precisely the same prices. The Board of Agriculture have, however, pointed out that the Sulphate of Ammonia Association, who control the sale, are free to obtain the world's market price for any surplus after the home demand has been met. It is added that the Association have, instead, sold the product to the West Indies "at prices considerably lower than those obtained from foreign countries." The Ministry feel, therefore, that they "cannot reasonably ask the Association to make any greater concession." Undoubtedly, the question presents difficulties; but it would certainly seem that British lands abroad are entitled to every possible consideration in this question of fertilizers, especially as they are producing foodstuffs for consumption in this country. In the circumstances, the simplest and most satisfactory development presumably would be a large increase in production, with a resultant automatic drop in prices.

MISCELLANEOUS NEWS.

PRICES OF SULPHATE OF AMMONIA, 1920-1921.

The Ministry of Agriculture and Fisheries and the Board of Agriculture for Scotland have come to an agreement with the great majority of the makers of sulphate of ammonia with regard to the maximum prices to be charged for this fertilizer in the season 1920-1921. These prices are the maximum net cash prices for sulphate of ammonia containing 24¾ p.c. by weight of ammonia, in makers' 2 cwt. bags, delivered in quantities of not less than 4 tons to the purchaser's or consumer's nearest railway station or wharf in Great Britain, or f.o.b. British port in the case of sales to Ireland, Isle of Man, or the Channel Islands, and are subject to a trade discount in the case of sales to manure mixers, agricultural merchants, dealers, and co-operative societies:—

Month of Delivery.	Price per Ton in Bags, Net Cash. £ s.
June, 1920	23 10
July ,,	23 10
August ,,	24 0
September ,,	24 10
October ,,	25 0
November ,,	25 10
December ,,	26 0
January, 1921	26 10
February ,,	27 0
March, April, and May	27 10

The other conditions of sale remain the same as during the past season, except that the additional charges authorized for each additional ¼ of 1 p.ct. of ammonia, for sulphate of ammonia containing less than 0·025 p.ct. of free acid, and for sulphate of ammonia specially ground at the purchaser's request, have been raised to 5s. 6d., 7s. 6d., and 7s. 6d. respectively; and as the basis scale of prices now applies to minimum quantities of 4 tons, instead of 2 tons, an additional charge of 5s. per ton is authorized for deliveries of 2 tons and over, but less than 4 tons.

Farmers should place their orders without delay with their usual dealer or co-operative society. Manure mixers, merchants, dealers, and co-operative societies should send their orders to the British Sulphate of Ammonia Federation, 30, Grosvenor Gardens, S.W.

Fuller particulars of these prices and conditions of sale will be given in a leaflet which will shortly be obtainable, post free, on application to the Director-General, Land and Supplies Department, Ministry of Agriculture and Fisheries, 72, Victoria Street, S.W.

PRODUCTION OF BENZOL.

Deputation to the Board of Trade.

At the offices of the Board of Trade last Friday, Mr. W. C. Bridgeman, M.P., Parliamentary Secretary, received a deputation representing the Motor Legislation Committee of the Royal Automobile Club, and the Commercial Motor Users Association, on the subject of benzol production at gas-works. It was urged on behalf of the deputation that an amendment should be introduced into the Gas Regulation Bill, now before Parliament, with the object of imposing upon gas undertakings the obligation of "scrubbing," with a view to the extraction of the largest possible quantities of benzol.

Sir William Joynson-Hicks, Bart., M.P., introducing the deputation, stated that it was common knowledge that there was a great shortage of available petrol, not only in this country, but in all parts of the world. The report of the Sub-Committee on Motor Fuel under the Profiteering Act emphasized this danger, and pointed out that the sole remedy was a largely increased production of home or empire produced fuel. So far as they were aware, the only spirit that could be made in considerable quantities at home was benzol, which could be used in mechanical road transport as effectively as petrol. Coal gas was the only source from which benzol could be obtained to any extent. Prior to 1914 the gas companies and coke-ovens produced more than 20 million gallons annually—a figure that was increased to 42 million in 1918, owing to the demands of the war services. Of this total 10 million gallons were produced at gas-works in various parts of the country. In 1919, however, the total production decreased to 20 million gallons, only 3 millions of which were produced by gas companies. The position taken up by the deputation was that as these undertakings were coming to Parliament for powers to revise their charges to consumers, Parliament was entitled to ask them for something for the community in return. The shortage of motor fuel was so grave that an exceptional effort was needed in the interests of the nation for the production of much larger supplies of benzol. As a matter of fact, such an effort was made during the war; and under the provisions of the Gas (Standard of Calorific Power) Act, 1916, the Board of Trade—in revising gas prices from time to time—were authorized to have regard to whether or not the undertakers had erected, or intended to erect, suitable crude benzol plant. Sir William suggested the insertion of a somewhat similar clause in the new Bill which had just been introduced into Parliament. This was asked for in no spirit of hostility towards the gas undertakings, but in the interests of the community as a whole, which depended so largely upon an efficient system of mechanical road transport. The increased charge for benzol which was announced that morning would more than cover the alleged financial loss to gas undertakings upon the extraction of benzol.

Captain R. H. Montgomery pointed out that the position of the gas undertakings was not that they made a loss upon the production of benzol, but that they did not make quite as much profit as when benzol was sold as gas. He estimated that in respect of those gas undertakings carbonizing more than 4000 tons of coal per annum, the production of benzol could be increased to between 52 and 57 million gallons.

Major Stenson Cooke pointed out that, in the event of serious labour trouble like the railway strike, the national position would be considerably improved if substantial supplies of home-produced fuels, such as benzol, were available.

Mr. Bridgeman promised that the subject should receive careful consideration.

TESTING AND STAMPING OF GAS-METERS.

Report as to Amendments Considered Desirable.

As intimated last week there is to be a meeting of the Association of Statutory Inspectors of Gas-Meters in the County Hall, Spring Gardens, London, on June 2, at 10.45 a.m., to discuss a report by the General Purposes Committee on amendments considered desirable in the law relating to the testing and stamping of gas-meters.

The following is the text of the report which the Committee will present:

The General Purposes Committee were instructed to report as to amendments considered to be desirable to the law relating to the testing and stamping of gas-meters, for consideration at a general meeting of Inspectors of Gas-Meters, to which the Committee was to invite representatives of authorities administering the Sale of Gas Act, 1859, the Board of Trade, the Institution of Gas Engineers, and the Society of British Gas Industries to discuss this report.

A good response has been received from administering authorities; and the different bodies herein mentioned will be represented at the meeting.

Mr. J. Ollis, the Chief Officer of the Public Control Department of the London County Council, has kindly consented to preside.

Principal Defects of Existing Law.

(*a*) Inadequate fees.

(*b*) Stipulated tests not sufficiently adequate to prevent the stamping of meters capable of registering incorrectly.

(*c*) Stipulated tests as to quantity per hour to be passed not practicable with meters of large capacity.

(*d*) Tests for accuracy of measurement in relation to the denominated capacity per revolution, not practicable.

(*e*) Incumbency of inspectors to personally test all meters submitted to him, not practicable.

(*f*) There is no provision in the Act whereby authoritative regulations may be drafted and issued for the guidance of inspectors for following an adequate and uniform procedure.

(*g*) There is no method specified in the Act for testing the indices of gas-meters.

(*h*) There is no provision requiring gas-meters to be periodically re-verified.

(*i*) There is no provision requiring the prepayment actions of meters to be tested.

(*j*) There is no general law respecting the testing of high-pressure gas-meters.

(*k*) It is not clear that the Metric laws apply to the Standard or Unit of Measure for the sale of gas by meter.

Inadequate Fees.

The Committee consider there is need for increased fees for the testing and stamping of gas-meters, and suggest there should be an increase of 100 p.ct.

Insufficiency of Stipulated Tests.

Percentage Error.—All parties will be agreed that the specified test for ascertaining percentage of error in a meter is not sufficiently adequate to prevent the stamping of meters which are capable of registering incorrectly by means practically prevented in good meters. There is, however, difference of opinion as to whether the specified test for percentage error is to be regarded as lawfully exhaustive as to correctness of registration. The Committee are not agreed that other conditions of pressure and quantity per hour may not be lawfully decided upon as to the correctness of the register of meters. In view of the fact that meters are fixed to pass any quantity per hour they are capable of passing, and that meters are capable of passing several times their nominal quantity per hour under service conditions, and that meters do vary considerably in registration under different pressure and quantity per hour, your Committee suggests that meters should be tested under conditions more nearly approaching those with which they are to be used. It is admitted that a consumer of gas may not fix a meter to pass more than its nominal quantity per hour; but there is no provision preventing the seller of gas from fixing meters without regard to their nominal capacity.

Index Test.—The Committee are of the opinion the matter has to be considered from the point of view of the inspector's lawful obligation to do certain things, for all authoritative rulings in the past have been to place the responsibility on the inspector to see that a meter registers correctly before he may stamp it. Your Committee suggests that the testing of gas-meter indices should be made compulsory.

Tests not Applicable to Meters of Large Capacity.

The Act provides that the inspector shall observe the rules in testing meters under the Act's provisions. The prescribed test for percentage error cannot be carried out with meters of large capacity as regards the quantity per hour which the Act requires to be passed at a low pressure. Differing results will be obtained with meters which are capable of registering inconsistently under different pressure and quantity per hour. The Committee are of the opinion that were it established authoritatively that meters are required to register correctly under different conditions within the limits for tolerable error, reasonable correctness could be ensured by two tests at widely different rates and pressure below or above their nominal capacity per hour—below in the case of large meters, above in the case of small meters, because of the need of dealing expeditiously with the additional test

with small meters. At present, the inspector's certificate may be set aside because he had not tested a large meter in accord with the requirements of the Act as regards quantity per hour passed.

MEASUREMENT IN RELATION TO CAPACITY PER REVOLUTION.

The Act requires that no meter shall be stamped which is found to be capable of measuring or registering incorrectly, and the inspector shall not stamp any meter without duly testing and finding the same to be correct. The Act further provides that no meter shall be fixed for the purpose of ascertaining the quantity of gas sold which has not its measuring capacity per revolution marked on it. The Committee suggest that amendment is necessary with a view to the impracticability of testing the measurement of meters as submitted in a finished state, under the conditions of pressure and quantity per hour prescribed.

PERSONAL OBLIGATION OF INSPECTOR.

The Act makes it incumbent on the inspector personally to test and stamp all meters submitted to him for the purpose. It is well known how impossible it is to do this in centres where meters are manufactured and repaired; and amendment in this respect is necessary as inspectors' certificates have been set aside because the testing operations were not carried out in accordance with the Act's requirements.

REGULATIONS.

There is no provision in the Act whereby authoritative regulations may be drafted and issued for the guidance of inspectors for following an adequate and reasonably uniform procedure with the testing of gas-meters. It is the opinion of the Committee that before any general good can ensue from the suggestions for the establishment of a more reasonable procedure with the testing of gas-meters, there must be one authoritative interpretation of the extent of the Act's requirements respecting the correctness of meters, and obligations imposed thereby on inspectors. It is therefore the suggestion of the Committee that the Board of Trade be empowered to draft and issue regulations accordingly, to be made binding on all concerned.

PERIODICAL REVERIFICATION OF METERS.

There are suggestions that meters should be re-verified periodically, and that such re-verifications should be made compulsory. There is no evidence that meters are not repaired, tested, and stamped more frequently than would be reasonable to suggest as necessary to be made compulsory. Therefore the Committee make no recommendations under this head.

PREPAYMENT ACTION TESTING.

The opinion of the Committee is that this test would seriously interfere with the work of stamping offices, and that official regulation should cease with the stamping of meters, and their indices found to be sound and registering correctly.

HIGH-PRESSURE METERS.

There is no authority empowering provincial inspectors of gas-meters to test and stamp high-pressure meters which compensate the register for difference in volume due to compression during measurement. There are suggestions that all such contrivances should be made illegal, and that sellers of gas should recoup themselves by a varied charge for different pressure. This suggestion raises a question as to whether the pressure of supply may be regarded as of a sufficiently constant factor. There are, however, high-pressure meters in use which compensate the register for a given pressure, and there are others which compensate for varying pressure. In the case of the former, the register of the compensating index would not compare correctly with the standard measure of gas under any pressure compensated. The Committee point out this fact to show how utterly impossible it is for the inspector to test and stamp these machines in accordance with the requirements of the Act of 1859, and not because of any supposed injustice in their use. It is suggested there should be optional legislation on the lines of the London Act, 1914, which applies specially to the testing of high-pressure meters. There is an important matter in the London Act which, in the opinion of the Committee, should be amended. One of the requirements of this Act is that high-pressure meters shall be correct within the meaning of the Sale of Gas Act, 1859, and if the rules in the Act of 1859 are not exhaustive as to the correctness of the register, the relation of the number of revolutions of the measure in high-pressure compensating meters to the capacity denominated on them will be inconsistent. If the compensating indices of all high-pressure compensating meters were tested—and it is the opinion of the Committee they should be—then certain types of meters could not possibly comply with the requirements of the Act of 1859, even though it may be held that the prescribed tests are to be regarded as exhaustive. The Committee therefore suggest that these evident inconsistencies should be taken into consideration in drafting any amending Bill.

METRIC EQUIVALENTS OF IMPERIAL STANDARDS.

It is not clear that the Weights and Measures Acts, relating to the Metric Equivalents of Imperial Weights and Measures, apply to the Standard or Unit of Measure for the sale of gas by meter only so far as: It appears that the Weights and Measures Act of 1878 provides for the re-verification of local standards of weights and measures of capacity. This provision evidently did not apply to gas-measuring standards, seeing that it was found necessary to insert a clause in a subsequent Act in 1889 in order to make the provision in the principal Act apply to gas-measuring standards. The Committee consider that it should be made beyond question whether the cubic foot is, or is not, the only legal standard or unit of measure for the sale of gas by meter.

OTHER DEFECTS.

Percentage Error.—Because of the improvements effected in gas-meters, it is considered the amount of tolerable error should be reduced. It is the opinion of the Committee that if meters are required to register correctly under different pressure and quantity per hour, reduction of error may mean the scrapping of many old meters that would otherwise be serviceable and register correctly within the present limits for tolerable error, or the cost of repair would be unduly increased thereby.

Stamping of Meters.—There is nothing preventing the repair of any stamped meter and refixing the same for use providing the stamp is not broken and nothing is done whereby the meter is caused to register unjustly or fraudulently. The Act requires meters to be stamped on such parts as shall in the opinion of the inspectors prevent fraud. Meters cannot be effectively sealed against opening with only one stamp. With the repair of a meter bearing several stamps the question arises as to when a meter bearing any unbroken stamp becomes an unstamped meter. It is the opinion of the Committee that it is desirable to affix but one stamp on the cover of the meter controlling the adjustment, and that it should be made illegal to repair and refix a meter without testing and re-stamping.

Oscillation of Lights.—The Committee consider that meters which cause oscillation of lights should be rejected, and that the law should empower the inspector to refuse to stamp them.

Soundness Test.—Meters are capable of registering considerably less flows than those lawfully tolerable to pass unregistered, which have long been regarded as commercially intolerable. In order to ensure that meters are sound under rates such as may be applied, it is necessary to work the meter through at least one revolution, which is not provided for in the Act. The Committee are fully aware there is nothing really new in this matter of desirable amendments to the law relating to testing and stamping of gas-meters that is not already well known to authorities administering the Sale of Gas Act, 1859, sellers of gas, meter manufacturers, and the Board of Trade; but inspectors of gas-meters under the Act consider—as do many administering authorities—the time is overdue when some better understanding should be arrived at, in order that effect may be given to the more important suggestions for amending procedure, which have on many previous occasions been urged without success.

BOMBAY GAS COMPANY, LTD.

Increased Consumption for Heating Purposes.

The Ordinary General Meeting of the Company was held last Thursday week at the London offices, Moorgate Station Chambers, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. A. Dickson, jun.) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN said it became his duty to move the adoption of the report and accounts. The history of the Company had been marred since the shareholders last met by the loss of their esteemed colleague, Sir Evelyn Wood—a friend of his own of 45 years' standing. He was one of the most modest, Christian soldiers who ever breathed. It was a great pleasure to the members of the Board to reckon Sir Evelyn among their number; and if there was any doubt on any question of morale or propriety, they had it laid down by him on straight and royal lines. The Directors missed him very much. They had mentioned this in the report; and therefore he would not reiterate what was said there. A suitable resolution had been sent by the Board to Sir Evelyn's family, and of this the shareholders would approve. [Hear, hear.] As to the business, the year had furnished the Company with an increase in the sales of gas of 7·3 p.ct., which was extremely satisfactory; and there was every prospect of this percentage being very much enlarged. It was quite true that the increase came, and would continue to come, chiefly from private consumption. It was equally true that, when he first occupied the chair, not more than one-third of the whole of the lighting was private, and, generally speaking, two-thirds of it was public. To-day the public lighting amounted to less than a third of the whole; and therefore the private consumption had given them an enormously increased business. This increase had been in quite recent years. Since 1912 (a little before the war) the sale of gas had advanced from 197 million cubic feet to 314 millions per annum, and the price had dropped from 8s. to 5s. 8d. per 1000 c.ft., which carried with it a charge as low as 4s. for the public lighting. To-day this price was a low one even for England; and as compared with the Continent, it was a very low one. The shareholders might be surprised to hear that in France, the Municipality and State had allowed an advance in the price of gas at Havre from 20 c. per cubic metre to 125 c.—about six times as much. The price of coal demanded this; but there it was, voluntarily—without any action, without any legal steps—the French people had come forward, and had paid the extra cost from their own pockets. However, that by the way. Their own concern was developing; and at the present time there was a great boom in Bombay. Rents were very high, and premises were very dear. All articles of consumption were going up because of the demand. Fortunately, the Company had secured, by the assistance of their officers in Bombay, a supply of local coal (at the current price) which would last for the next three or four years. If their General Manager in Bombay wanted to plume himself upon anything, it might be upon this circumstance. Seeing the price of coal in this country, and in France it was worse than in England—being some £7 or £8 per ton, and it was still going up—the shareholders of the Bombay Company must all be very gratified that they were under the shelter of a contract of this sort. There was no competition. He should like to run a ship from Calcutta with coal to try to turn-down some of these high prices; and he was sure they would get good value for every ship-load. It was not their business, however, to do this. If it were, they had three or four ships in a French company with which he was associated which the Directors would be willing to sell cheerfully, because they were not allowed to ship coal from here to France. This again was an aside. Coming back to the report, the profit for the year as shown by the net revenue account was sufficient to enable the Board to pay a dividend of 8 p.ct. for the year. In these times, when they were accustomed to have dividends of 2 or 3 p.ct. in England, a dividend of 8 p.ct. must be satisfactory. Coming to the accounts, he should only weary the shareholders by going through them in detail. If he told them, with regard to the items of the revenue account—the expenditure and the income—that they were all particularly good, and that the working had been (as any expert would testify) admirable, and

reflected great credit on both the technical and clerical staffs, he need not say much more. He need only mention in respect to the capital that whereas last year, owing to depreciations, they had a small credit on mains and meters, to-day they had an increase, and an important increase. This was because, although there had not been a great deal of work, prices had been high. The work, small as it was, and exaggerated as was its cost, was essential to the extension of the business—whether for public lighting (which was of pressing importance), or for private consumption. It was perhaps desirable to point out that the private consumption undoubtedly went on in the direction of heating as in England. The burners used for lighting were incandescent ones; and many heating appliances had been introduced through the Company's show-room for the purpose of bath-water heating, cooking, and other things. It was the experience in warm climates—like Buenos Ayres and the South of France—that the hotter the country the more need was there for a supply of gas for heating purposes, because they did not want any more heat than for the operation on which they were engaged. They wanted something that they could light-up at once and turn out again as soon as the work was done; and this they could not do with an ordinary fire—whether made of coke, coal, or wood. In these ways, they saw the future of the Company was well established; and the anxiety that used to press on him very much when he considered the possibility of "their friend the enemy" stepping-in, and taking away the lighting business, was very much assuaged, because if electricity took away the whole of the lighting, there would in future be a considerable development of the gas-heating trade. Gas was the most convenient and most distributable fuel in the world. Labour to-day—whether domestic or the familiar horse-and-cart driver in the street—was very costly, and it had much deteriorated; so the turning-on of a tap to get heat appealed to all nations, to all classes, and in all climates. This facility was going to make gas one of the most powerful elements in the future progress of the world. He was very much struck to see in "The Times" the other day that a large manufacturer in Toronto had given notice to the Hydro-Electric Company that he could not afford to pay their rates any more. This was electricity generated by one of the forces of Nature, and not requiring the consumption of fuel; and even then, this manufacturer in Toronto was moving away, because he could no longer afford to pay the price of the electric energy. When he (the Chairman) was at Niagara, and saw the big electricity generating works there, he was told that twenty miles away, with electricity obtained free from the waterfall, the cost of conduction was such that it paid a manufacturer better to put up a steam-boiler and generating plant, and to produce his own electric energy. This was told him by a high scientific authority; and it was unquestionably true. The Directors' report went on to say that a resolution would be submitted to the shareholders for the adoption of new Articles of Association, which would be explained at the extraordinary meeting. The origin of these articles was a communication to himself from a shareholder, Colonel Christie, who was on the Stock Exchange, and who thought that a concern which had developed so largely should pay better fees to the Directors. The Board knew the articles were rather old-fashioned, and in many points would be better for revision. In consequence, they put the matter into the hands of their solicitor; and he had prepared the articles which the shareholders would be asked to confirm. Among other things, they would do a little more justice to the Directors. His colleagues and himself had, under the old articles, been paid fees which would not to-day remunerate the stokers in some gas-works in this country in the management of which they assisted. He put the plain issue before the shareholders, and was quite prepared to strike if they did not do him justice. [Laughter.]

The Deputy-Chairman (Mr. W. G. Bradshaw, C.B.E.) seconded the motion.

Mr. S. Spencer said the balance-sheet was an excellent one; and the proprietors were much obliged to the Directors and the officers for it. He had said before to his colleague in another Company [Mr. Hunt] that they were connected with two of the finest gas balance-sheets in the world. That of this Company was one of them.

The motion was unanimously carried.

Moved by the Chairman and seconded by the Deputy-Chairman, a final dividend of 4 p.ct., less income-tax, was declared—making, with the interim dividend, 8 p.ct. for the year.

The Deputy-Chairman proposed the re-election, as Directors, of the Chairman and Mr. Louis Penny. He remarked that there was no greater authority in gas matters than Mr. Jones. There was no gas company in the world that would not be proud to have him on the Board. Mr. Penny brought to them a local knowledge which was of great value; and the shareholders would agree that it was of great importance to the Company that they should have on the Board a gentleman who personally knew India.

Mr. Charles Hunt seconded the motion, which was cordially agreed to.

The Chairman said he was much obliged to the shareholders. Like himself, his colleague was an old servant. They perhaps got a little dictatorial and troublesome as time passed; but he hoped their fidelity was at least equal to that of the modern servants. [Laughter.]

Mr. Penny also acknowledged the confidence of the shareholders in him.

The Chairman, referring to the re-appointment of the Auditors, remarked that their present remuneration was not very considerable, and he might throw out the suggestion that it should be put at 40 guineas or such other sum as the shareholders thought fit.

On the motion of Mr. H. F. Hills, seconded by Mr. Stammers, the Auditors (Mr. Spencer Gore Browne and Mr. Ernest W. Drew, F.C.A.) were re-appointed, at a fee of 40 guineas.

NEW ARTICLES OF ASSOCIATION.

An Extraordinary Meeting was then held to consider the new Articles of Association, and, if thought fit, to pass the following resolution:

> That the Articles of Association now submitted to the meeting, and identified by the signature of the Chairman of the Company, be and they are hereby adopted as the Articles of Association of the Company in place of the existing articles.

The report mentioned that it was proposed to make provision in the new articles (*inter alia*):

(*a*) For the adoption of the modern practice in regard to the voting power of shareholders—viz., to give each shareholder one vote or every share held by him.

(*b*) For the fixing of the maximum and minimum number of Directors at five and four respectively instead of, as at present, ten and five.

(*c*) For the increase of the annual remuneration of the Directors to the sum of £2000, with an additional £500 for each Director over the number of four. The present remuneration is £1000 with an additional £100 for each increase of 1 p.ct. per annum in the Company's dividends beyond 6 p.ct.

The Secretary read the notice convening the meeting.

The Chairman said the new articles were purely a legal business. They had a most eminent solicitor on the Board (Mr. Bradshaw), who was also an eminent financier. He would ask him to run through the various alterations from the lay point of view.

Mr. Spencer: What was the date of the original articles?

The Solicitor (Mr. Blyth): April 26, 1862.

The Deputy-Chairman, in the course of his remarks in proposing the adoption of the resolution as quoted above, said the Directors had given notice of the principal alterations in the report; and it was difficult to say much more about them. They had brought the articles up to date. Articles that were sixty years old were not of much use nowadays. For instance, Article 3 said that no part of the funds of the Company should be applied to the purchase of the Company's own shares; while the old articles allowed them to do this. This was a proceeding that would not be permitted by the Stock Exchange. As to borrowing powers, under the old articles they could borrow up to one-half of the paid-up capital. Now they might borrow up to the nominal amount of the capital. But this power was not likely to be made use of. It was one of the strong points of the Company that they had no debentures. Then the voting power was altered to one vote for every share, instead of the limit of fifty votes with the enactment that shareholders must be registered for six months before being able to vote. The number of the Directors was to be not less than four, nor more than five; but power was given to the shareholders, under Article 100, to increase the number of the Directors, if they thought fit. The Directors' qualification was formerly 100 shares, to be held six months prior to the date of election; now the qualification might be acquired within two months of the appointment. The Directors' remuneration, now £1200, had been placed at £2000. The scale of remuneration was fixed just sixty years ago. He hoped the shareholders would think the increase more than justified by the great progress the Company had made in the last twenty years. The business had grown enormously. In 1912 Mr. Jones alluded to the remuneration, and then said he thought it was inadequate. A shareholder who was present remarked that he thought the shareholders ought to have 8 p.ct. before the Directors got anything more. They had had 8 p.ct. for three years; so Mr. Jones's remarks were more than justified. Some minor points were also mentioned.

Mr. Spencer seconded the motion. He remarked that he came to London in 1865. He had known every Director of the Company since that date, and so had seen a good many out. The Directors fees started at £800 a year; and they were increased to £1000 in 1871. Then there was an automatic rise of £100 for every 1 p.ct. increase of dividend. The amount went up to £1100 when 7 p.ct. was paid, and then to £1200 when 8 p.ct. was paid. The increase should date back to Jan. 1, and be in all other respects on the same terms as the present remuneration as to income-tax. The addition was well deserved.

Mr. Drew expressed approval of the alterations in the articles. He was certain there would be no criticism, because it was quite time the articles were brought up to date. He personally was not a believer in large boards of directors. He was a member of a board of four directors, and of one of three in another company; and they worked well and harmoniously. His experience was that a small board was more workable than a large one. As to the Directors' remuneration, he did not think they ought to carp at that. A Company like the Bombay Gas Company ought to have the best Directors they could get; and the shareholders were satisfied the Company had the best that they could have. Having got the best, they should be remunerated in the proper manner.

The motion was unanimously carried.

The Chairman proposed a vote of thanks to the officers and staff, both at home and in India. The shareholders had good ground for being more than pleased and gratified with the services of all of them. In these circumstances, they would not grudge the usual recognition of the services of their worthy Secretary and the London staff, as well as of their General Manager and Engineer (Mr. A. R. Burch), Mr. Lane, and the other members of the staff in India, who had served them so faithfully.

Mr. Spencer seconded the motion, which was cordially passed.

On the proposition of Mr. Drew, seconded by Mr. Henry Jacob, a hearty vote of thanks was passed to the Chairman and Directors.

The Chairman, having acknowledged the vote, expressed the gratitude of the Board to Mr. Spencer and Mr. Drew for their advocacy of the matter of the Directors' remuneration. It was very gratifying to them that this had come from the shareholders' side of the table.

Record Make of Gas at Clitheroe.—Alderman Whiteside (Chairman of the Clitheroe Gas Committee) explained to the Council last week that they had had a record year for production; 83 million c.ft. having been manufactured, which was an increase of 6½ million on the previous twelve months. Though wages had gone up 161 p.ct., coal 114 p.ct., taxes 200 p.ct., and retorts, &c., 204 p.ct., the price of gas had only advanced 93 p.ct. There was a profit of £1723, which he advocated should be placed to depreciation. It was proposed to increase the price of gas 6d. per 1000 c.ft. Under the Local Act, they could not charge more than 5s.; and with another 6d. this limit would be reached.

MONTE VIDEO GAS AND DRY DOCK COMPANY, LTD.

Increase of Dividend—Substantial Increase in Gas Consumption—Impending Retirement of the Manager.

The Ordinary General Meeting was held last Wednesday, at No. 321, Dashwood House, New Broad Street, E.C., Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Henry Kearns) read the notice calling the meeting; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said when the Directors had the privilege of meeting the stockholders last year, he ventured to suggest the probability of the Company's dry dock and workshops department sharing in the great activity which had set-in throughout the world in connection with shipbuilding and repairing. This probability had, up to the present, proved a reality; and they had the satisfaction of recording for the year now under consideration returns from this department largely exceeding those of any previous year. To the exceptional activity of this branch of the business was mainly due the ability to recommend a substantial increase of dividend. The Directors did this with a greater pleasure inasmuch as their mainstay (for so he might call the gas department) was at the same time continuing to make very gratifying progress. The consumption of gas for the year showed an increase of 10·60 p.ct., and the demand for gas-heating appliances continued to be satisfactory. As the proprietors were, however, doubtless fully aware, there continued to be considerable difficulty in obtaining materials and appliances of all kinds, and prices had gone up enormously. He need not tell them, moreover, of the continued scarcity of coal, for this had been brought home to everyone; and the Company would have been worse off than at any time during the war, but for their having been able to obtain supplies from America. Coal cost three times what it did before the war, while for iron and steel required for ship-repairing they were paying three to four times pre-war prices. Turning to the accounts, it would be seen from the credit side of the balance-sheet that, in pursuance of what had been their practice for a good many years with regard to depreciation, the capital expenditure at the end of the year showed a reduction of £4160. It was interesting to note that since 1900 the capital expenditure had in this way been brought down from £600,446 to the present figure of £528,141—a reduction of £72,305, notwithstanding the great expansion of business in both departments which had taken place in the interval. Needless to say, the aim which had been kept steadily in view during all these years had been to reduce the large excess of capital employed relative to the business, as being, in the opinion of the Board, absolutely necessary for the purpose of assuring the future of the undertaking. The value of stocks was less by about £2000 than that of the previous year, while sundry debtors and outstanding accounts were more by about £17,000. Investments showed an increase of about £10,000; and cash in hand a reduction of approximately £2000. On the other side of the balance-sheet, there had been added to the reserve account £8000, bringing this up to £40,000; and he could not help thinking that the proprietors would wish the Board, as opportunity allowed, to pay a little more attention to this account than had been possible during the last few years. To deferred maintenance there had been added from profit and loss another £2000; and it was hoped the time might not be far distant when the conditions would have sufficiently improved to enable the expenditure of practically the whole of the £15,000 now set aside for the much-needed purposes for which it was required. Sundry creditors stood at a higher figure by about £11,000, compensating to this extent for the increase in sundry debtors on the other side. On the whole, he thought it would be agreed that the balance-sheet showed the Company to be in a thoroughly sound financial position, contributory to which was the fact that the revenue account showed a credit-balance for the year of £43,123, as against one of £20,581 for the previous year. From the solid increase of £22,542, which these figures represented, had to be deducted the smaller profit made on exchange and depreciation of investments, making together £6858, and leaving £15,684 as the net increase of available profit, subject to certain small adjustments which did not materially affect the result. It would be noticed that no addition had been made to the sum set aside last year for superannuation, which was due to a law regarding superannuation having been passed by the Government of Monte Video. Under this scheme employers contributed 8 p.ct. and employees 4 p.ct. on the total wages; but it had hitherto been restricted to employees of public utility undertakings. Endeavours were, however, being made in the Legislature to widen its scope, so as to embrace industries generally, in which case the dock and workshops department would be included as well as the gas department. Having regard to the possibility of this development, it had been felt advisable in the meantime to postpone the scheme which the Directors had in view. There was another matter which was mentioned last year, and to which it might be expected he should again refer. He alluded to the impending retirement of their valued General Manager in Monte Video (Mr. Lane). Mr. Lane had again expressed his desire to relinquish his appointment at the earliest date suitable to the Board; and the Board were taking steps to enable them to comply with his wishes. He had served the Company long and faithfully, and no one could have better earned the retirement which was his due. When he went out thirty years ago to take control of the Company's affairs, these were not in a flourishing condition, nor was it possible for many years to pay shareholders more than what might properly be termed a meagre dividend. In spite of all discouragement, however, Mr. Lane stuck to his post; and he had now the satisfaction of seeing the undertaking in a much more prosperous condition. Quite recently they were much gratified on hearing that he had been selected by the British residents in Monte Video to welcome in their name the arrival of the new British Minister, Sir Claude Mallet, which was a gratifying indication of the esteem in which he was held. It could be readily understood that to replace this valued official was no light task; but the matter was one which was constantly engaging the attention of the Board. They now awaited the return home of their colleague, Mr. W. Edgar Horne (who, in the course of an extended tour in South America, recently visited Monte Video), before deciding what further steps could be taken in the matter. Not the least of the valuable services which Mr. Lane had rendered to the Company had been his tactful handling of the labour unrest with which Monte Video, as elsewhere, had been teeming. This unrest had by no means left the Company untouched, but, thanks to skilful management, had dealt it perhaps the minimum of harm. He ought not to close these few remarks without referring to the prospects of the undertaking, which had now achieved, as the accounts showed, a thoroughly sound position. The proprietors, however, would hardly be human if they did not desire to know if the dividend, which was the highest that had been earned since the early, and what might be called the palmy, days of the Company, was likely to be continued. He thought it was but right to say that this greatly depended upon a continuance of the present activity of the dock and workshops department, as to which there had as yet been no falling-off. But there had been many fluctuations of this branch of the business in the past; and it would not do to dismiss as unlikely the possibilities of such fluctuations in the future. The whole country of Uruguay, with its Port of Monte Video, was just now prosperous; and it was hoped might long continue to be so. But there had been many disappointments in the past; and the only thing certain was that they were in a better position to-day than ever before to withstand the "slings and arrows of outrageous fortune." And it would be the endeavour of the Board, so far as circumstances might permit, to pursue the policy which, in their opinion, had contributed materially to the soundness of the position which everyone could not but feel the Company now occupied.

Mr. JOHN MEWS seconded the motion.

Dr. LEWERS remarked that unfortunately he was a shareholder in a less prosperous Company in South America; and he should like to ask whether the Company were allowed to raise the price of gas in proportion to the cost of coal.

The CHAIRMAN said the Company had no concession; and so they were not restricted as to the price of gas. Their chief concern was to give satisfaction to their consumers.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. FRANK H. JONES, a dividend was declared, for the half year to Dec. 31 last, of 3½ p.ct., free of income-tax—making with the interim payment 6 p.ct. for the year, free of income-tax.

The CHAIRMAN moved the re-election to their seats on the Board of Mr. Frank Jones and Mr. W. Edgar Horne, M.P. He remarked that both these gentlemen were well known to the stockholders. Mr. Jones, although not a veteran in years, had already achieved distinction in the gas industry, and his services on the Board were most valuable. Mr. Horne also rendered most valuable service; and his colleagues were awaiting with great interest the report he would make to them as to Monte Video on his return from an extended tour in South America.

Mr. MEWS seconded the motion, which was adopted.

Mr. JONES having replied for himself and his absent colleague,

Dr. LEWERS moved, and Mr. STRANGMAN seconded, the re-appointment of Sir Laurence Halsey and Mr. W. C. Sneath as Auditors, at a fee of 35 guineas each—an increase of 15 guineas each.

The CHAIRMAN proposed a vote of thanks to the whole staff for their services during the year. He was sure the proprietors would feel with the Directors that this vote was fully deserved. The officers, staff, and employees generally had all done their utmost for the Company not only during the past year, but for many years. He had already mentioned the services of Mr. Lane. As to Mr. Kearns, he also thoroughly deserved their best thanks.

Mr. QUINTON seconded the motion, which was cordially agreed to.

Mr. KEARNS, on behalf of all concerned in the vote, thanked the proprietors. He should send a copy of the resolution to Monte Video. It would be much appreciated by Mr. Lane and the whole of the staff.

Major COOPER proposed a vote of thanks to the Board for their excellent report and the results of the year's working.

Mr. A. J. KINGDON seconded the motion, which was heartily passed.

The CHAIRMAN, in replying, said the Board would endeavour to do in the future as they had done in the past—their very best for the Company.

CAPE TOWN AND DISTRICT GAS LIGHT AND COKE COMPANY, LTD.

A Greatly Improved Financial Position.

The Ordinary General Meeting of the Company was held last Wednesday, at Egypt House, New Broad Street, E.C.—Mr. J. E. LILLEY in the chair.

The SECRETARY (Mr. R. W. Blackburn) read the notice convening the meeting, and the Auditors' report to the shareholders, and the Directors' report and the statement of accounts for the year ended Dec. 31 were taken as read.

The CHAIRMAN, in formally moving the adoption of the report and accounts, said he was pleased to be able to tell the shareholders that the past year's business was the biggest the Company had ever done. There had been an increased make of gas of 15 million c.ft., bringing the total make up to over 204 millions. But even this did not reveal the full progress of the Company, because, though they only made 15 million c.ft. more, they actually sold 20 million c.ft. more than in the previous year. This increased make was secured in spite of the fact that 500 tons less coal were used in manufacture. The increased sale in proportion to the make shows that considerable improvements had been effected in the matter of unaccounted-for gas. A year ago he had expressed the opinion that it might be possible to reduce the leakage. They believed at that time that they knew the cause of part of it; but they had been unable to get the work done under war conditions. It had been expensive; but the Board were satisfied that the improved results had accrued from the work that had been undertaken. During the year under review they had experienced continual increases in expenditure in every part of the business. Coal had cost 6s. 11d. per ton more; wages cost over £3000 more; and all materials

displayed very considerable rises in price. But, to set against this, there was the increased business that had been done.

POINTS FROM THE ACCOUNTS.

It would be noticed that in the revenue account, on the debit side, the first item was cost of manufacture and distribution. There was an increase here of just about £5000; the increased charges for coal accounting for a great portion of this, notwithstanding the fact that, as he had mentioned, they had used 500 tons less. Wages accounted for another large amount; but when they came to the other side, and saw what the result had been, he thought they would agree that there was no cause to complain. Under repairs and maintenance there was another increase of about £5000. Various circumstances had contributed towards this. There was not only the increased cost of wages and materials, but they had carried out a good deal of work in this department. Over £1000 more than in the previous year had been spent on meters. The old meters had been repaired, so far as they could get workmen to do it; but there had been a shortage of the skilled mechanics who were required for this sort of work. It was hoped gradually to bring up everything to first-rate condition. This would well repay them, as they would thus be able to do more business. As the demand for gas had increased so largely, they had found it necessary to repair some old retorts which had been regarded as scrapped. Having been in use for a period of five years, the time had come when their vertical retorts had to be shut-down for the carrying out of necessary repairs and renewals. This was rendered possible by the patching-up of some of the very old retorts, which had enabled them to maintain the supply. The vertical retorts had now been re-set and put into thorough order; so that with the present demand for gas the Company could get along very well. Then a good deal of money had been spent in looking for leakages in the ground. Old books were consulted, showing where meters once were and did not now exist; and a good many old services which were taken up in this way showed that they had been the cause of considerable leakage. Some leakage was also found in a number of services still in use which were repaired. During the year, 498 new meters were supplied, to replace old ones. But even this did not enable them to keep-up the number of their consumers, because a large quantity of meters had been brought in for repair, and it had been impossible to replace them fast enough. However, the best that could be was done; and in cases where people were not using very much gas, the Company asked for permission to remove the meters, so that they might be placed in more remunerative positions. Wherever meters were newly fixed, the Company were asking for an undertaking from the consumer to pay a minimum amount, whether or not the gas was used. Another thing that had had to be undertaken was the re-sheeting of two of the gasholders, all the material for which had been sent out, at a cost of more than £2000. It was hoped that when this work was completed it would also assist in reducing the leakage. Steps had been taken, as he had mentioned twelve months ago, to renew some of the plant in use—such as washer-scrubbers and condensers. But these things the Board considered to be fair charges against the renewal account provided for the purpose; and they had therefore transferred £2000 from that account. The work was not yet nearly completed, because it was impossible to get quick delivery. The next item was rent, rates, and taxes, which exhibited an increase of £1300. The amount of the rates in the pound had been increased; and the assessments on the properties had also been raised. Directors' fees for London and Cape Town figured at £1700, as against £1400 last year. This arose from the fact that during the time when dividends were not being paid, the Directors voluntarily surrendered £300 of their remuneration. Now, however, that the Company was in a very healthy and strong position, and about to clear-off all the arrears of preference dividend, the Directors felt sure the shareholders would no longer wish them to forego part of their ordinary fees. The reduction in the amount of interest in respect of first mortgage debentures outstanding arose from the redemption of £2500 of debentures.

ON THE CREDIT SIDE.

Turning to the credit side of the account, the first item showed increased receipts from the sale of gas amounting to £8500. No increased charge whatever had been made for gas during the whole of the year. The Board had considered the matter from time to time; but they had come to the conclusion that it was not in the best interests of the Company to increase the charges, if it could possibly be avoided. The prices were already higher than they wished to see them; and it was felt that the way to increase business was to keep them at as reasonable a level as they were able. Therefore the gain of £8500 to which he had referred had resulted entirely from the larger quantity of gas sold. From the sale of residuals £1000 more than in the previous year was received. About the same sum as before resulted from the sale of fittings, &c. Interest on, and adjustment of, values of investments was less than last year. The investments had increased nearly £3000; but the reason that the amount for interest, &c., was not greater—for all the securities were very good indeed—was that it had been necessary to write-off about £400 for depreciation. Interests, discounts, allowances, &c., exhibited an increase of £500, resulting from the larger receipts on account of deposits at the bank, and from greater discounts and allowances. The final result of the twelve months had been a profit, after paying debenture interest, and making proper provision for the insurance and bad debts account, of £18,595. The sum brought forward from the previous year was £2207, and there was also the £2000 transferred from the reserve for plant renewals, making a total of £22,803. There had been written-off for depreciation of stock £1066, and transferred to the reserve and contingency account £2500. They had paid already £4500 in preference dividends; and it was proposed to pay another £9000. Having done this, no arrears of preference dividend would remain to be paid. This would be a great incubus removed from the shoulders of the Company. In future, there would be only the annual preference dividend to be paid; and this would place the ordinary shares in a much better position. From the balance of £5736, it was proposed to pay a dividend of 4 p.ct. on the ordinary shares, which would leave them with a sum of £1736 to carry forward to the next account. This the Directors regarded as a very satisfactory position; and it gave them the keenest pleasure to find themselves able at last to recommend a dividend on the ordinary shares, with every prospect of continuing to do so. There was due a half-year's dividend on the preference shares in respect of 1920; and this would be paid.

AS TO THE FUTURE.

This concluded what he had to say with regard to last year's business. As to the future, he might say that the cost of coal and wages was still increasing. Taking all the circumstances into consideration, the Board had come to the conclusion that they could not any longer bear these increasing prices with the old charges for gas; and therefore, as from the beginning of this year, they had raised their rate 10d. per 1000 c.ft. This would affect only ordinary meter users. The price to prepayment consumers was considerably above this before; and up to the present no steps had been taken to lessen the amount of gas supplied to them for a shilling. The Board did not want to do it if it could be avoided. So far as the present year had gone, the Company had done an increasing business as compared with the same period of the previous year. It had not been a large increase; but still it was quite satisfactory. They hoped that it would continue during the remainder of the year. He thought they might reasonably entertain fair expectations for the future; for the Company stood in a very sound condition. The finances had been brought into much better order.

NEW CAPITAL ISSUE FORESHADOWED.

There would undoubtedly be fresh capital required for new vertical retort extensions ordered, which would cost about £40,000 by the time they were brought into full working order. At a later date it would be necessary to approach the shareholders about raising money to meet this outlay. There should not be any difficulty about the matter; but the Directors would be pleased to have suggestions from shareholders on the subject. Personally, he would very much prefer that it should be raised by an issue of ordinary share capital; and he was hopeful that the Company's improved position might induce shareholders to see that it would be to their interest to subscribe for ordinary shares, though they would not do it at their present market value. They wished to avoid, if they could, having any more charges before the share capital. The new retorts would effect very great savings. In wages alone, he did not hesitate to say that the saving would be large, and better results would be obtained than by the plant they had so far been compelled to use. The new retorts which had been ordered were on the same principle—the Glover-West system—as the vertical retorts which they had in use at the present time, and which had done them such very excellent service. But there would be many improvements of which they would have the benefit; and there was no doubt whatever that the results would be very good indeed. They must have them to provide gas to meet increasing demands. There were 657 customers waiting to be supplied with gas as soon as the Company could do so; but they could only go on so fast as the supply of materials and labour would permit. A contract had been made for coal for the next year at about 4s. per ton more than last year; but there would be increased costs for carriage, which would probably bring it up to 5s. 6d. There was, however, reason to believe that the coal was of somewhat better quality than that which they had been using. They had in this respect experienced considerable trouble during the past year. Complaint had been made of the quality of the coal, but without getting any redress. The Directors wished to thank the shareholders for their patience, and for the confidence they had shown in them. The Company's position was entirely different from what was the case some years ago. There had been but one drawback, and that was that there had not been sufficient cash capital. They had had to redeem since 1910 £37,000 of their first mortgage debentures, which had been done entirely out of revenue. They would find exactly the same amount standing to the reserve and contingency account. The Company had not got this money; it was invested in the business. It had really taken the place of the capital which had to be redeemed. This had been a good investment, because there had been no interest to pay. In the future there might be some suggestions as to what should be done with this reserve and contingency account. The redemption of debentures had gone on until there remained only £13,000 to be redeemed. They had been redeemed for a few years at the rate of £5000, and then for a few years at the rate of £2500 a year. This was the rate at which they were proceeding now; so that in five years there would be none left. They had now transferred £2500, making £39,558 standing to the credit of the reserve and contingency account. The shareholders might rest satisfied that the Company was in a position now to carry on its business satisfactorily, as soon as the new plant and the money to pay for it were available.

The VICE-CHAIRMAN (Mr. H. R. Savory) seconded the motion.

Mr. WHITAKER inquired as to the nature of the investments and the reason why sundry creditors had jumped-up so largely.

Mr. W. H. HARDING asked whether the Company imported supplies or used African coal. Were the new verticals to be a renewal or an extension of plant?

The CHAIRMAN replied that they were using African coal entirely, and had been doing this for some six years past. The investments were all liquid securities—largely war loan. The increase in sundry creditors came mainly under the heads of coal and income-tax, and goods and plant in transit. At the end of the year there was some income-tax unpaid which had since been cleared-off. The new verticals would constitute an extension of plant.

The resolution was then carried unanimously.

Mr. SAVORY proposed the re-election of Mr. J. E. Lilley as a Director; remarking that he had been Chairman for many years. His knowledge of the technical side of the business, and his application to the numerous details, had very largely contributed to bringing about the prosperous condition in which they found the undertaking to-day, as compared with its unsatisfactory state a few years ago.

Mr. R. A. FAIRCLOUGH seconded the proposal, which was agreed to.

The Auditors (Messrs. Kemp, Sendell, and Co.) were re-appointed.

The proceedings concluded with a hearty vote of thanks to the Chairman and Directors, on the proposition of Mr. E. NICHOLLS, who expressed great gratification at the payment of a dividend of 4 p.ct. on the ordinary shares.

WATER-GAS PLANT FOR TEIGNMOUTH.

Ministry of Health Inquiry.

An application by the Teignmouth Urban District Council for sanction to borrow £9000 for the provision of water-gas plant and a relief holder, the widening of the railway bridge, and the erection of a weighbridge at the gas-works, formed the subject of a recent Ministry of Health inquiry by Mr. W. M. Cross.

Mr. A. P. Dell (the Council's Solicitor) said there were nine benches of retorts at the works, and six were in constant use. Mr. Higham had suggested vertical retorts. Mr. W. Doig Gibb was called in as Consulting Engineer; and as a result of jumping prices, it was found that work expected to be done for £17,250 would cost from £22,000 to £25,000, with the possibility of still further increases. Mr. Doig Gibb had confirmed Mr. Higham's report; but the larger scheme had been abandoned for the present. It was necessary, however, that something should be done; and Mr. Higham suggested the introduction of a water-gas plant, which would mean a big saving in cost. The question of the new holder had been gone into; and though included in the subject for the inquiry, the Council hoped to do without it. Before the war, the price of gas at Teignmouth was 3s. per 1000 c.ft. The Council had recently received the sanction of the Ministry of Health to increase this to a maximum of 6s. 9d. There was no doubt that, unless some large saving could be brought about in the cost of production, there would be considerable loss on the working this year. There had been a loss during recent years, and the balance of £3000 had been swallowed-up. They were now faced with the possibility of a charge on the rates. This had been brought about, not through any fault of the Council, but solely because of the enormous increase in prices. Before the war, freight to Teignmouth for seaborne coal was 4s. 6d. per ton; now it was £1 a ton more than railborne coal.

Mr. Harold Higham (the Gas Engineer and Manager) said the cost of the vertical retorts was too high; and as they could get the water-gas plant at work more quickly, he recommended its adoption. The present maximum output of gas was 200,000 c.ft. per day, and was as high in the summer as in the winter. This was the reason for applying for the loan early. The Tully plant was suitable for small works such as theirs. On a basis of coal being obtained at 46s. 6d. per ton, it would cost 2s. per 1000 c.ft. to produce water gas, as against 3s. 6d. for coal gas—a saving of 1s. 6d. per 1000 c.ft. He hoped it might not prove necessary to provide the relief holder; and the expenditure would then be reduced by £3360.

The Inspector said that the Ministry were inclined to insist on a clause being inserted in such cases limiting the CO content to 15 p.ct.; but Mr. Higham asked for an exemption from such a limitation, as being inimical to the industry. He pointed out that the Board of Trade urged the fullest use of water-gas plants in the interest of coal conservation.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 21.

There is little alteration to report in the London tar products market. Pitch still maintains its extremely firm position, there is still considerable demand for prompt shipment, in spite of the lateness of the season; and forward inquiries are also numerous. The price is reported to be not below 155s. net per ton f.o.b. makers' works. Creosote is from 1s. 1d. to 1s. 2d. per gallon in bulk *ex* producers' works; and there is a ready home market. Other products remain unchanged.

Sulphate of ammonia for home agriculture. The present price expires at the end of this month. An announcement as to its future arrangements is shortly expected.

Tar Products in the Provinces.

May 21.

The average values for gas-works products during the week were: Gas-works coal tar, 92s. to 97s. Pitch, East Coast, 140s. to 150s. per ton f.a.s.; West Coast—Manchester, 135s. to 140s.; Liverpool, 135s. to 140s.; Clyde, 140s. to 145s. nominal. Benzol 90 p.ct. North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 2d. to 2s. 4d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 11½d. to 1s.; salty, 10½d. to 11½d. Heavy oils, in bulk, North, 1s. to 1s. 0½d. Carbolic acid, 60 p.ct., 3s. 11d. to 4s. Naphthalene, £35; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 9d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

There does not appear to be much change in either prices or conditions since last report; but there is still much uncertainty as to how far tar products will be affected by the increase of 4s. 2d. per ton on industrial coal. The market in pitch is very firm. The South Wales briquette makers, who have held aloof for a long time, have had to come in at last, and are now paying top prices. High-water mark appears to have been reached at £7 10s. per ton. This price is reported from Manchester; and foreign buyers, while trying to ensure their supplies for next season, are more careful, and evidently look for a lower range of values. Crude tar has advanced to 80s.; prepared tars are scarce and greatly needed. Pyridine has been in request at 17s. Benzol prices are not yet changed; but there is a feeling that higher prices will shortly be announced. Solvent naphtha is steady on fair

Main's "Housing" Cookers.

HOUSES are building slowly yet surely, and the Government Department concerned with the nation's need in this respect has made its selection of cookers suitable for present and future schemes.

The Main "Surrey" Cooker on stand was an early choice, and this popular Stove has already been supplied in large numbers to those districts fortunate enough to have schemes certificated by Government.

The design, dimensions, finish, and price of the "Surrey" Cooker make it ideal in every respect.

May we send you our "Housing Problems" booklet. It will assist you with the Housing Schemes in your District.

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WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE.

business—the tone being distinctly better than for some weeks past. Creosote is unchanged. Carbolic crude 60's is dearer at 4s. 3d., and crystals 40 p.ct. remain nominal. Exports are still being made in spite of a refusal of licences to the usual channels. Questions on this subject are likely in Parliament after the Whitsun recess. Naphthalenes are scarce, and quotations difficult to fix. Ball naphthalene is mentioned at £45 per ton. Intermediates continue an interesting market, although very little changed. Aniline oil and salts and salicylic acid are much wanted; but quotations are unchanged.

Latest quotations are as follows:

Benzol: 90% **London** 2s. 5d. to 2s. 7d., **North** 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 3s. 3d. per gallon naked.

Crude Tar: London, 77s. 6d. to 80s.; Midlands, 75s. to 77s. 6d.; North, 75s. to 80s. per ton *ex* works. Refined tar, 55s. per barrel (free) on rail.

Pitch: London, 155s. per ton; East Coast, 145s. to 150s. per ton; West Coast, 135s. to 150s., with Manchester 150s. per ton, and Glasgow 150s. per ton; South Wales, 155s. per ton.

Solvent Naphtha: London, 3s. 7d. Provinces average 3s. 5d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined, £40 per ton nominal; inferior, £30; crude, £10 10s. to £20, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 1s. 0¾d. to 1s. 1d.; North, 1s.; heavy oil, 10¾d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 5d. to 1s. 6d. per lb., drums extra.

Aniline Salts: 1s. 10d. to 2s. per lb.

Cresylic Acid: 95%, 4s. 3d. to 4s 6d.; 97-99%, 4s. 6d. to 4s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 4s. 3d. per gallon; crystals 40%, 1s. 4d. to 1s. 5d. per lb. (nominal).

Salicylic Acid: Technical, 3s. 6d. to 3s. 9d.; B.P., 3s. 9d. per lb.

Sulphate of Ammonia.

The season is now at an end, and the question of prices for the new season is having the attention of the Association. An advance of 20 p.ct. is probably justified; but 10 to 15 p.ct. increase is what is being looked for generally. Farmers can easily afford such a trifling addition; and sulphate of ammonia would even then remain the cheapest nitrogenous fertilizer on the market. The export demand is still good, and there are hopes of building this up to a greater extent during the off-season at home.

There is no fresh news from America; there being no improvement in conditions on the Pacific Coast.

Nottingham's Annexation Proposals.—Considerable disappointment has been occasioned in Nottingham municipal circles within the last few days, by the receipt of an official intimation that the Ministry of Health have been unable to acquiesce in the application of the Corporation for a wide extension of the city boundaries. The fact that outside places were entirely dependent upon Nottingham for their gas, as most of them also are for water, had been largely relied upon in support of the annexation proposals, which were vigorously opposed by the neighbouring authorities, upon the score that their inclusion would render them partly liable for an incubus of municipal debt which they were in no way responsible for creating. Though the Corporation have suffered a temporary rebuff, it has been already made abundantly clear that matters cannot be allowed to remain in their present ambiguous state, and that steps will be taken to renew the application in some modified or extended form.

National Health Week at Halifax.—During "Health Week" at Halifax, the Gas Department engaged Mr. R. Gamble Marks to give demonstrations of the proper use of a gas-cooker. On the question of economy in the use of gas-cookers, Mr. Marks told a Press representative that "there should be an honoured guest in every British home to-day; and his name is 'Thrift.'" The gas-cooker was in times past considered a "back-number." But the housewife of to-day, in studying her domestic budget, will find what a fresh view-point can do in the home. Women have always been good shoppers; and their instinct for value is rarely at fault. At the enhanced price of bought bread, she is now going in for making her own, using the gas-cooker for the baking. She finds that, though flour has gone up 1s. a stone, she can get as much bread now, or more for the same money, by doing her own baking, as she did before the rise. This is one of the many ingenuities adopted, enabling her to keep ahead in the never-ending battle with prices.

Progress at Stafford.—Having found it necessary to give up some of his public work, Alderman Thomas Westhead, J.P., has, as recorded last week, decided to resign his position as Chairman of the Stafford Gas Committee, which he has held for over six years. Since November, 1913, when he became Chairman, the progress of the undertaking has been marked. The output of gas during last year was 324 million c.ft., an increase of 104 millions since 1913. New vertical retorts and other plant have been installed during his chairmanship. Since the Corporation took over the works in 1876, the output of gas has increased six times. The total capital at the start of the undertaking was equal to £11 per ton of coal carbonized; but to-day the figure is £3 4s. 8d. Though the net cost of coal per 1000 c.ft. of gas, after deducting receipts from residuals, &c., has gone up nearly five times, compared with 1879—to 14d., as against 3d.—the Corporation are still able to sell gas at the same price as then obtained. But for the war, the effect of the reconstruction at the works would have been to reduce the price of gas in Stafford at the present time to 1s. 6d. per 1000 c.ft.

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A Long Strike Approaching Settlement.—There seems a likelihood of the long drawn-out dispute between the Campbell Gas-Engine Company, of Halifax, and their employees coming to an end. The strike took place last July; about 300 men ceasing work because returned soldiers were being employed without some generally approved scheme. Most of these men's places have been filled, and many of them have secured jobs elsewhere. There are, however, nearly 100 who are still without work, and receiving out-of-work pay from the Union. The settlement efforts have been largely due to the Right Hon. J. H. Whitley (Deputy Speaker), who on the 15th inst. convened a conference of the employers and men's representatives. It is considered extremely likely that a resumption of work will soon be made.

Mr. C. S. Shapley (the General Manager of the Leeds Corporation Gas-Works) reports that 25 million c.ft. of gas were used in manufacturing operations in Leeds during the last quarter, as compared with 8 million c.ft. per quarter in 1914. There are 213 factories using this means of heating their furnaces.

The Southend Corporation Parliamentary Committee have had reported to them the fact that a meeting has taken place between representatives of the Corporation and of the Gas Company relative to the provisions of the Southend Gas Bill and the Corporation's objections thereto. As a result of this meeting, and of conferences which have taken place between the engineers advising each party, it seems likely that a satisfactory agreement will be arrived at, and parliamentary opposition avoided.

It was decided at a meeting of the War Memorial Committee of the Birmingham Corporation Gas Department that the memorial should take the form of a cenotaph to be erected at the head offices, as a permanent memorial, and that a general welfare fund for the whole department should be formed to render assistance as required to dependants of soldiers and sailors from the department killed in the war or who died on active service. To form the nucleus of this fund, it was suggested that a uniform contribution of 2d. per week be made from all sections of the department for twelve months, at the end of which time the matter will again be reviewed.

STOCK MARKET REPORT.

THERE was not much improvement in the general tone of markets on the Stock Exchange over that of the preceding week, but perhaps this was scarcely to be expected when preparation for a holiday closure was in course. In addition to this, however, some factors provocative of anxiety were to the fore—some domestic, some foreign In result, movements were unsteady, and varied almost from day to day. But happily the closing Friday was better than some others.

The gilt-edged division was not exempt from trouble; and Home Government issues were very weak for the first three days. Eventually, with the exception of Consols, they almost recovered; Friday's figures being: Consols 47⅞-47⅞, War Loan 85½-85⅝, Funding 69½-70, Victory 79⅛-79¼. Corporation issues were rather lower. Home Rails were very quiet and dullish, except for prior charges. Canadians were not much in evidence; but Argentines were in request.

In the Foreign Market, French Loan fluctuated with the exchange, and the general tendency was susceptibility to change.

The Miscellaneous Market presented many weak points, especially where unwelcome realizations were too abundant.

Business in the Gas Market was a good deal quieter; those issues which recently have been the most active being now fallen into a calm. By far the bulk of transactions was in Gas Light ordinary and South Metropolitan, both of which made further additions to their gains of the week before. Commercial again was not dealt in. In Suburban and Provincial, Brentford "A" and "B" advanced; but Newcastle and Sheffield "C" were easier. In Continentals, Imperial was very quiet, and closed with a mark of 131 and a fall in the quotation of 7½. Primitivas also were little dealt in.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 37½, Croydon "C" 93½, 94; European 6½, Gas Light ordinary 56, 57, 57½, 57⅝, 58, 59, 60, ditto debenture 46, 46⅜, 48, Imperial Continental 134, 135, 136, 137, ditto debenture 82, Primitiva 228. 6d., South Metropolitan 56, 57, Tottenham "B" 44⅜, 45½. On Tuesday, Gas Light ordinary 56½, 57, 58, 58½, ditto maximum 38, ditto debenture 46, Hastings and St. Leonards 3½ p.ct. 40, Imperial Continental 133, Monte Video 75½, Primitiva preference 378. 6d., 40s., South Metropolitan 57½, 58, 58½, 59, 59½, 59⅝, 60, South Suburban 66, 67. On Wednesday, Alliance and Dublin 40, Gas Light ordinary 56½, 57½, 57⅝, 58, ditto debenture 46, Imperial Continental 133, Primitiva preference 37s. 6d., South Metropolitan 58, 58½, 59½, 60. On Thursday, European 6, Gas Light ordinary 56, 56½, 57, 57½, ditto preference 57, 57¼, 57½, ditto debenture 47, Imperial Continental 134, Primitiva 20s., South Metropolitan 59, 59½, 60. On Friday, European 6 7/16, Gaslight ordinary 56½, 57, 57½, Imperial Continental 131, Monte Video 76½, 77, Oriental 104, Primitiva preference 40s., South Metropolitan 59½, 60.

In the Money Market there was a steady demand at rates which rather increased in firmness as the week progressed; but there was no excessive pressure. Silver was unusually steady, and took no wild flights. The Bank rate is 7 p.ct., as fixed on April 15.

Though there has on this occasion been no general legislation, the Canadian Provinces of Quebec and Ontario have this year again adopted the daylight saving scheme.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When ex. Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME	Closing Prices. July 22, 1914	Present Prices	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,858	"	Mar. 26	2½	3.5.%	Alliance & Dublin Ord.	39—41	37—42	37½—40
874,800	"	Jan. 15	4	4%	Do. 4 p.c. Deb.	76—79	61—63	..
250,000	5	May 13	7½	8%	Bombay, Ltd.	5⅞—6⅛	4⅞—5¼*	..
50,000	10	Feb. 26	16	10%	Bournemouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	20—22	8½—9	..
388,110	10	"	7	7%		15—15½	9—10	..
115,800	10	"	6	6%		13½—14	8½—9	..
162,065	—	Dec. 30	—	4%		..	64—66	..
993,045	Stk.	Feb. 12	14	80/-	Brentford A Consolid.	251—256	45—50	..
784,920	"	"	11	26/8	Do. B New	204—209	42—47	..
55,800	"	"	5	5%	Do. 5 p.c. Pref.	109—111	70—75	..
221,400	"	Dec. 11	4	4%	Do. 4 p.c. Deb.	91—93	84—86	..
214,775	"	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	121—126	..
244,200	"	"	8	5½%	Do. A Ord. Stk.	154—159	80—85	..
1,287,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	20	Apl. 14	12½	10%	British	44—48	24—26	..
190,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	58—60	59—61	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	55—57	47—50	..
100,000	10	"	—	—	Cape Town & Dis., Ltd	1½—2½	7½—7⅞	..
100,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—6⅞	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk	70—72	58—63	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,250	"	Feb. 26	5/9/4	33.4	Commercial 4 p.c. Stk	106—108	48—53	..
580,000	"	"	5½	26/8	Do. 3½ p.c. do	108—105	44—49	..
475,000	"	Dec. 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	46—49	..
500,000	"	"	4	—	Continental Union Ltd	76—79	27—32	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	118—119	40—60	..
51,600	Stk.	Feb. 26	14½	10½%	Croydon A 10 p.c.	..	130—140	..
178,408	—	"	11½	7½%	Croydon B and C 7 p.c.	..	90—100	98½—94
492,270	Stk.	—	6	5%	Derby Con. Stk.	138—135	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,902,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6—7	6—6½
15,398,975	Stk.	Feb. 12	4/17/4	80/-	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98—102	55—60	56—60
2,600,000	"	"	3½	26/8		76—79	38—43	38
4,962,385	"	"	4	4%		96—99	55—58	57—57½
4,574,850	"	Dec. 11	3	3%		72½—74½	45—48	46—48
180,000	"	"	10	10%		..	..	..
82,500	"	Mar. 11	6	33⅓%	Hastings & St. L. 5 p.c.	..	55—60	..
258,740	"	"	8½	25⅞%	Do. 3½ p.c	37—39	33—43	40
70,000	10	May 13	11	7%	Hongkong & China, Ltd	16½—16½	8½—9½*	..
66,500	Stk.	Mar. 11	9	6⅔%	Hornsey 7 p.c.	..	88—93	..
181,000	"	"	7½	5⅓%	Ilford A and C.	151—154	86—91	..
65,780	"	"	6½	4⅔%	Do. B	115—118	65—70	..
66,600	"	Dec. 30	4	4%	Do. 4 p.c. Deb.	93—94	57—60	..
4,940,000	"	May 14	9	4½%	Imperial Continental	158—160	130—135	131—137
1,225,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	80—85	82
225,242	"	Mar. 26	6½	5½%	Lea Bridge Ord. 5 p.c.	119—121	60 - 65	..
2,498,985	"	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A B	211—213 146—148	..	..
806,068	"	June 26	4	4%	Do 4 p.c. Pr. Deb. Stk.	..	..	..
165,795	"	Feb. 26	7/5/8	33⅓%	Maidstone 5 p.c.	..	52—57	..
15,000	5	June 11	5	5%	Malta & Mediterranean	4½—4⅝	1⅞—2½	..
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	98—101	89—96	..
541,980	Stk.	Nov. 27	4	6⅔†	Monte Video, Ltd.	11½—13	74—78	75½—77
1,575,592	"	Feb. 26	4½	3½%	Newcastle&Gateh'd Con.	98½—99½	62 - 64	..
699,795	"	Dec. 30	3½	3½%	Do. 3½ p.c. Deb.	85—88	55—57	..
15,000	10	Mar. 11	—	8⅓%	North Middlesex 10 p.c.	..	18—18½	..
55,940	10	"	7/14/0	6⅔%	" 7 p.c.	14—16	8½—9½	..
600,000	Stk.	May 13	6	5%	Oriental, Ltd.	117—129	103—105*	104
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	4⅜—5½	..
60,000	50	Mar. 11	15	7½%	Portsea, Island B	125—131	66 - 71	..
180,000	50	"	12	6⅔%	Do. C	118—121	63—68	..
242,980	5	April 29	8	—	Primitiva Ord.	5½—6	7 - 12	20/—22/6
499,966	5	June 26	5	—	Do 5 p.c. Pref.	4⅜—5	1½—2½	37/6—40/-
521,500	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	70—72	..
600,000	Stk.	Jan. 29	4	4%	Do. " 1911	..	47—50	..
346,198	"	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	47—50	..
150,000	10	Mar. 26	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½—11	7½—7⅞	..
125,000	50	Dec. 30	5	5%		47—49	39—41	..
135,000	Stk.	Mar. 11	10	50/-	Sheffield A	228—234	68—78	..
209,984	"	"	10	4½%	Do. B	229—234	58—68	..
228,500	"	"	10	35/5	Do. C	220—225	54—57	..
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	Oct. 15	9	10%	South African	10½—11½	12—18	..
6,609,895	Stk.	Feb. 12	5/4/0	80/-	South Met. 4 p.c. Ord.	111—113	56 - 61	56—60
250,000	"	Jan. 15	—	5%	Do. Pref.	..	98—95	..
1,895,445	"	"	8	8%	Do. 3 p.c. Deb.	72½—74½	47 - 50	..
294,890	"	Feb. 25	3½	3%	South Shields Con. Stk	157—159	103—104	..
1,087,795	"	Aug. 14	6	3⅔%	S'th Suburb'n Ord 5 p.c.	114—116	64—69	66—67
247,558	Stk.	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	78—83	..
647,740	"	May 13	7½	3⅔%	Southampton Ord.	99—103	57—60*	..
121,275	"	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	61—63	..
120,000	"	Aug. 14	4	3⅔%	Tottenham { A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	60—65	..
782,275	"	"	6	2⅔%		115—117	45—50	44½—45½
181,255	"	Dec. 11	4	4%		87—89	61—64	..
129,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
142,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	98—98	45—50	..
226,476	Stk.	Mar. 11	5	3⅓%	Tynemouth 5 p.c. max.	108½—109	71—73	..
80,000	"	Feb. 26	3½	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	83—88	..
256,686	"	"	6½	40/-	Do. B 3½ p.c.	129—134	61—66	..
108,075	"	"	—	33/6	Do. C	..	61—66	..
140,865	"	"	—	33/6	New Ordinary	..	61—66	..
363,000	"	"	5½	33/9	Wimbledon 5 p.c.	117—122	63—68	..
98,000	"	"	6⅔	40/-	Epsom 5 p.c.	121—126	63—68	..
83,416	"	Dec. 30	3	3⅔	3 p.c. Deb. Stk.	66—69	43—50	..

* Ex Div. † ext dividend will be at this rate.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for May 19.]

Nos. 12,848—13,458.

ADNAMS, S.—"Fitting for supporting globes, &c., of lights." No. 12,850.
BALL, F. J.—"Inverted gas-mantle repair outfit." No. 13,191.
BILLINGTON, W. J.—"Gas cooking-stoves." No. 12,875.
CAMMELL, LAIRD, & Co.—"Pipe joints, and apparatus for shaping ends of pipes therefor." No. 13,104.
CARTER, Sir G. J.—See Cammell, Laird. No. 13,104.
DEUTSCHE PATENT-GRUDEOFEN-FABRIK W. RIESCHEL & Co.—"Gas-burner for bakers' ovens." No. 13,111.
DUCKHAM, Sir A. M.—"Gasification of fuel." No. 12,937.
DUCKHAM, Sir A. M.—"Plants for gasifying fuel." No. 13,373.
FÉLIZAT, G. L.—"Destructive distillation of schists, shales, &c." No. 12,951.
GUIGNARD, G. P.—See Félizat. No. 12,951.
KEITH, G. & J.—"Annealing-furnaces, baking-ovens, &c. No. 13,234.
KROGH, S. A. S.—"Recording analyzing apparatus for automatic analysis of gases." No. 12,961.
MOORE, S.—"Vertical gas-generator." No. 13,035.
PEDERSEN, P. H.—See Krogh. No. 12,961.
PERRY, W. P.—"Apparatus for distilling carbonaceous material." No. 12,894.
ROGERS, R. J.—"Incandescent gas-burners." No. 13,151.
SMITH, A. J.—"Inverted incandescent gas-burners." No. 12,864.
THORP, F.—See Rogers. No. 13,151.
THORP, F. & H. T.—"Gas-burners." No. 13,152.
WATSON, C. S.—"Apparatus for exhausting or compressing gases." No. 13,238.
WOODALL, DUCKHAM, AND JONES.—See Duckham. Nos. 12,937, 13,373.
WORSFOLD, J.—See Smith. No. 12,864.

The gas workers in the Paris district decided to resume work last Wednesday; and an order for the resumption of work was sent by the union to the provinces.

Mr. Harold Rook, a chemist at the Allerdale Coal Company's bye-product plant, at Great Clifton, Cumberland, has extracted from tar, as a result of experiments, a varnish which it is expected will have very considerable commercial possibilities.

Negotiations are proceeding between the Spenborough District Council and the Bradford Corporation to acquire on behalf of the first-named body the gas-mains which the Corporation own at Scholes and Oakenshaw. When the transfer of the mains is completed, under the Cleckheaton Act of 1914, the Scholes and Oakenshaw district consumers will be able to be supplied at the Cleckheaton price, which for them will mean a reduction.

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